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INTERNATIONAL FIRE PROTECTION

THE GLOBAL VOICE FOR PASSIVE & ACTIVE FIRE PROTECTION

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Spray test in M30 tunnel, Madrid: courtesy of © FOGTEC

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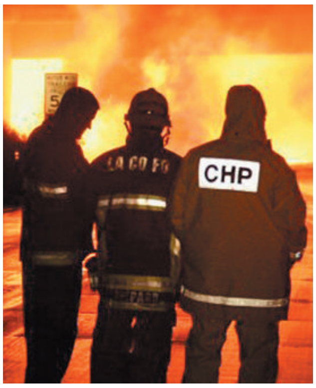

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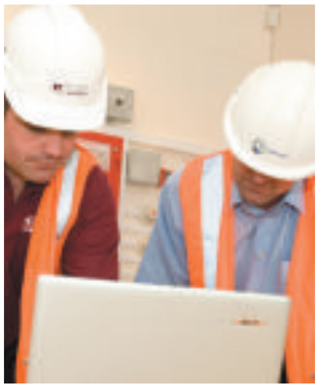

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Bosch's Building Integration System:

The powerful way to manage the complete security of your enterprise

Building Integration System (BIS) is a flexible building management system which can be configured to suit the individual needs of every customer. It contains a wide range of applications and features to enable the integration and coupling as well as the monitoring and control of all vital technical building systems. Each generation builds on BOSCH's many years of experience in management systems with more than 2000 installations worldwide, and is right up to date with all the latest technical and market trends.

Bosch has led the field in implementing OPC compliancy for building security management, and its customers now benefit by easily integrating a wide range of Bosch and 3rd party security systems under one platform. This range includes fire and intrusion panels, video systems, access control, public address or building automation devices.

BIS's flexible structure, based on the three main modules: Automation (AUE), Access (ACE) and Video Engine (VIE), facilitates an incremental approach which grows with the customer's requirements. Start, for example, with Bosch's sophisticated access control hardware using ACE, and enhance it with the wide world of Bosch video and intrusion detection systems. Combine fire and safety with public address, and add the monitoring of technical alarms to provide the highest level of protection for personnel and assets, all from one integrated platform.

A flexible user interface, with customizable screen content on up to four screens per workstation, provides for the needs of different operator groups within the same site. With its central alarm management, using location maps with animated detector icons and automated display of procedural instructions for any eventuality, BIS provides the perfect overview and the means to deal with any alarm situation calmly and effectively.

Faster installation, configuration and maintenance mean better protection sooner. To this end Bosch has developed a number of other innovative auto-configuration capabilities in the individual Engines to increase the responsiveness of both the installer and the operator.

Building Integration System is suitable for applications of many sizes and types. These include banks, airports, shopping malls, industrial sites, office complexes, residential buildings, museums, warehouses, utilities, medical facilities, school and university campuses.

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VSO sounder/beacon

CRANFORD CONTROLS is yet again living up to the expectation of bringing innovative and fresh product to the fire safety sector and have exceeded all anticipation with their latest offering.

Due for launch early this year is their VSO sounder beacon with its uniquely designed LED ring. This has been created to ensure light is diffused out in all directions providing a full 360° light output.

As with all Cranford products, the VSO sounder/beacon is aesthetically pleasing, discrete when not in use but highly visible when triggered.

When launched, this product will be available with the 32/4 tone choice (this includes all major worldwide tone variants), thus supplying the user with both audible and visual alert, taking the DDA into account.

As with the original VSO sounder, the VSO sounder/ beacon is also engineered to fit all leading brands of smoke detectors. If required the product may also be used as a wall mounted sounder/beacon by using it in conjunction with the readily available matching cover plate.

For further information please contact Cranford Controls sales department on +44 (0) 1420 592 444

Quadnet provides peace of mind for council offices

RAFIKI's Quadnet Intelligent Addressable Fire Detection System has been specified and installed at the new Neath Port Talbot Council premises at Baglan Energy Park in South Wales.

The project's main electrical contractor, Highadmit Projects Ltd, was tasked with providing a fire detection system that could cope with the diverse demands of a large office development and a Service Response Centre, housing the Council's vehicle depot.

Quadnet was selected due to its ability to suit a variety of applications, small and large. Its powerful software gives the capacity to build a networkable system of up to 250 panels, making Rafiki's addressable, Multipoint+ detector technology available to customers with systems of up to 200,000 devices.

Commenting on Quadnet, Mekola Tuchli of Highadmit Projects said, "Quadnet brings a variety of benefits to this project including a large sounder capacity on the loop, and ease of installation through combined detector/sounders and loop-powered sounder/beacons. The office layout is likely to change, so the advantages of the Multipoint's choice of seven modes of smoke and heat detection and a built-in isolator means that if the use of a room or the system zoning changes, detector modes can be changed to suit and no extra isolators need to be added".

Another important factor for the contractors was the aesthetics of the fire alarm control panel as it needed to be located in the reception area of the Council building. Quadnet, a red dot product design 2006 award winner, has sleek, modern panels that are discreet and stylish enough to be displayed in public areas, making it ideal for this. "Quadnet's contemporary exterior works well to complement its surroundings", added Mekola Tuchli.

Two networked Quadnet control panels and over 500 devices were installed throughout the new premises, ensuring that staff and visitors alike will be best alerted in the event of a fire.

The system was supplied and engineered by Bridgend-based fire alarm company, Morris Churchfield. "Quadnet will provide facilities managers at Neath Port Talbot Council with the peace of mind that they have a state of the art fire detection system" concluded Geraint Thomas, Project Manager for Morris Churchfield.

Further information on Rafiki is available from Rafiki Protection Ltd.
Tel: 01633 865558
Email: pr@rafiki.biz
or by visiting the company's website www.rafiki.biz

Klaxon to Make a Stand at Firex

KLAXON SIGNALS will be showcasing the flagship ranges of Sonos and Nexus electronic sounders, beacons, and sounder/beacons at the Firex South exhibition in Sandown this year. The Sonos range has been designed for small to medium fire alarm installations whilst the high output Nexus range is suitable for larger commercial and industrial applications.

The stand will feature a 'Live' demonstration area for the recently launched Voice enhanced fire alarms so visitors can experience first hand the superior message quality and technically unparalleled features of Klaxon products. The demonstrations will show visitors how the Voice enhanced sounders can be integrated into new or existing fire and gas extinguishing alarm systems via interface controller units without extra cabling or commissioning costs.

The Klaxon range of fire and industrial alarms has been designed for easy installation, reliable performance and low maintenance. To discuss any of Klaxon Signals' products or take a closer look, please come and meet the team at Stand B8 who are happy to help with all signalling requirements.

Klaxon Signals Limited is one of the world's leading manufacturers and suppliers of sound and vision signalling equipment for fire and life safety, industrial and security applications. Part of Halma p.l.c., Klaxon offers an extensive range of fire alarm sirens, electronic sounders, buzzers, beacons and bells, in addition to innovative evacuation technology and software.

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New water portables offer the total® solution

The recently introduced TOTAL® range of premium-build portable fire extinguishers has added a new dimension to the ubiquitous water portable. In addition to offering two industry-standard water extinguishers, the TOTAL offering also includes anti-freeze protected models, and two special water portables designed specifically to fight smouldering sawdust fires.

The standard models are 6-litre and the 9-litre extinguishers that are suitable for Class A fire risks that include wood, paper, straw and textiles. They provide impressive projection of the extinguishant, optimal water bead dimension, and the ability to discontinue delivery of the extinguishant at any time. The anti-freeze versions of the same extinguishers are built to withstand temperatures as low as minus 20°C and are ideal for use on garage forecourts, loading bays, rail, aviation and marine environments, warehouses and storage areas.

The "special" TOTAL water portables are also available as 6-litre and 9-litre models and are purpose-designed to ensure a fast knock-down of sawdust fires that can easily break out in joinery shops, furniture manufacturing plants and timber processing facilities; all it takes is a spark from a saw or a router striking a nail.

They were developed by TOTAL because, while smouldering sawdust fires respond well to water, conventional Class A water portables lack the ability to deliver the water correctly, and water alone is not always the most effective agent. The new TOTAL portables incorporate a unique spray nozzle that delivers the correct drop size and flow intensity to fight sawdust fires, and use the newly formulated, fast knock-down TOTALON A™ water-based agent that incorporates special liquid additives. This is released when a CO_2 (Carbon Dioxide) container within the cylinder is activated.

These particular portables are also very effective for protecting other environments, such as flour mills, where even small amounts of dust or fine powder are likely to accumulate and pose a real fire or explosion threat. For several years, the USA's NFPA (National Fire Protection Association) considered that around 1.5mm of dust was sufficient to pose a risk of flame spread; the OSHA (Occupational Safety & Health Administration) has recently reduced this to just 0.8mm.

All TOTAL water portables comply with all of the relevant international standards, and were developed at the TOTAL dedicated portables research and manufacturing facility in Neuruppin in Germany. They are part of an extensive collection of standard foam, water, CO_2 and powder portables and a growing catalogue of special-application portable extinguishers.

Virtually every stage of cylinder manufacture is under the direct control of TOTAL, including material selection and sourcing in Europe, the most advanced low-heat plasma welding, fabrication, assembly and

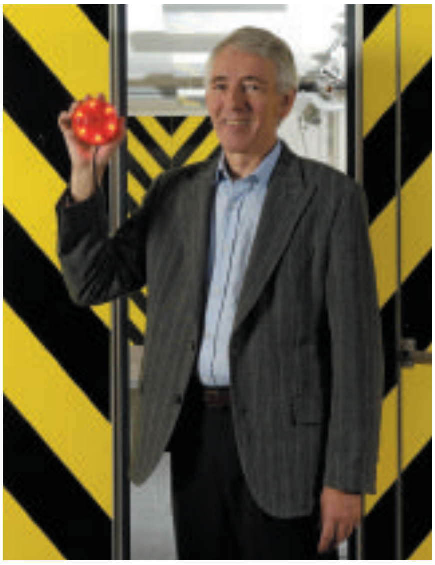
high-performance powder-coating, cylinder pressure testing and agent filling. This commitment to quality is underpinned by uniquely numbering each and every TOTAL cylinder to provide a complete and reliable quality audit trail.

They are manufactured from specially formulated steel that remains flexible after forming and welding. The one-millimetre-thick internal powder coating is widely recognised as the industry's most hardwearing surface. Every cylinder is electrode-tested twice to ensure that there are no pin-point flaws in the coating, and the quality of the finish can be judged by the fact that there is a complete absence of colour fading that is a common feature of many inferior quality cylinders. Even the cylinder wall-mounting brackets are designed to ensure that there is no metal-to-metal or metal-to-wall scuffing.

Every TOTAL portable is guaranteed for five years, providing it is serviced from new in accordance with the appropriate regulatory standards. IFP

TOTAL portables are available in the UK through Express Fire in Manchester on 0161 688 5050, or from Tyco Fire Suppression & Building Products on 01493 417600.

Siemens builds a better beacon



Dr Kurt Moeller

Developed for use as a high efficiency flashing visual alarm device in fire safety systems, the new Sinteso Beacon from SIEMENS BUILDING TECHNOLOGIES features a novel design that rapidly attracts attention to an alarm condition by making use of specific response characteristics of the human eye.

The new beacon offers excellent visibility from any angle, and its low power consumption not only saves energy, but also makes it ideal for use in two-wire detector-bus installations where only limited power is available for alarm devices.

Based on work carried out by Dr Kurt Moeller, one of the leading innovators at Siemens Building Technologies headquarters in Zug, Switzerland, the new Sinteso Beacon incorporates six exceptionally reliable LED light sources that require only a modest amount of power for operation.

The LEDs are complemented by a special reflector system that ensures the light is diffused laterally. As a result, the light from the beacon remains easily visible even in large low rooms and extended spaces such as corridors.

In designing the new beacons, Dr Moeller has made use of the extreme sensitivity of the human eye to movement at the edge of the field of vision. In order to take advantage of this, the six LEDs in the beacon illuminate consecutively at intervals of a few milliseconds. The effect on the retina is the same as that produced by movement seen out of the corner of the eye, and the observer's attention is, therefore, rapidly drawn to the beacon.

For his work on the new Sinteso Beacon, and for other work on improving the immunity of infrared detectors to false alarms, Dr Kurt Moeller has been honoured as one of Siemens Inventors of the Year for 2007. In the course of his career, he has pioneered many refinements in security systems and is responsible for 34 major inventions, 18 of which have been patented.

Reflecting Siemens commitment to and leadership in innovation, the Inventor of the Year Award was introduced in 1995, and honours twelve outstanding researchers each year. Candidates for the Award are drawn from among the approximately 32,500 developers and researchers employed by Siemens around the world.

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Hochiki to show latest innovations

HOCHIKI EUROPE will be showcasing four of its most recently introduced new products at Firex South, plus it will be offering visitors to stand number H11 the chance to enter a free prize draw. On show will be the Hochiki FIRElink high-sensitivity smoke detection system, the new FIREvac modular voice alarm system, the fast-response Hochiki IFD industrial flame detectors, and the new Hochiki powered output module.

Hochiki predicts that FIRElink will make high-sensitivity smoke detection technology available to a much wider range of businesses and applications. It incorporates advanced semiconductor laser and electronics technology into a package that the company says shows substantial savings in whole-life cost when compared with other systems on the market. Applications include: smaller non-compartmentalised rooms; warehouses with racking; and electronic and electromechanical equipment.

The company's new voice alarm system, FIREvac, can be easily integrated with an existing fire detection and alarm installation. It delivers all of the benefits of voice evacuation at a very affordable cost, and it is designed to simplify achieving an installation that is fully compliant with BS 5893-8:1998, the Code of Practice for the design, installation and servicing of voice alarm systems. The new system boasts many of the features found on more costly voice alarm systems on the market and incorporates a number of innovative cost and installation labour saving features.

The new IFD industrial flame detectors are designed for applications where open flaming fires are likely to occur. They respond only to the light emitted from flames; they can be relied upon to differentiate between flames and other light sources and so avoid false alarms that might otherwise be caused by, for example, flickering sunlight. The range comprises three models: an intrinsically safe detector; an explosion-proof model; and an IR^3 detector that is particularly suited for use in high-risk petrochemical installations.

Hochiki's new CHQ-POM powered output module for its ESP – Enhanced System Protocol – analogue addressable open protocol enables the simple connection of third-party devices, such as IFD-E flame detector, to the ESP loop. The compact-design module supplies 24Vd.c. at various current levels from 2mA to 32mA in increments of 2mA. It offers users the facility to select the current output, includes two monitored inputs, and has colour-coded flying leads for trouble-free installation.

For more information please contact:
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Email: sales@hochikieurope.com
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Invisible equipment for a breathtaking building

Bosch installs complete security system in the Munich Event and Delivery Center

When the contract for installing security equipment in the new Event and Delivery Center was put out to tender, a supreme level of security was just one of the key requirements. Another crucial specification was that the equipment must also do justice to this spectacular building.

By Erika Görge

Communications Manager

With its completion in October 2007, BMW's Event and Delivery Center named BMW Welt has taken its place as Munich's newest architectural marvel. In BMW Welt, which covers about 15,000 square meters between the landmark "Four Cylinder" BMW Tower, the car manufacturer's corporate headquarters, and the Olympic Park, customers can take possession of their new vehicles and visitors can enjoy the company's brand experience. The building also serves as the central meeting point for plant tours and the entrance to the neighbouring BMW Museum.

With its distinctive double helix and floating cloud roof, BMW Welt is one of the first of a new generation of communications structures for the 21st century. But the building is unique in more ways than just its external appearance. Inside, visitors are expected to employ all five senses as they experience the extraordinary atmosphere, down to the smallest details: shifting spatial perspectives, easy navigation and supreme comfort. It is a showcase of the company's brand that is truly memorable.

An innovative security concept designed by Bosch allows them to do this with complete peace of mind. As the primary contractor for "wireless signalling and communication systems", Bosch installed the entire security system in BMW Welt. This included alarm systems for fire, robbery and intrusion, video surveillance, emergency exit door control, and the public address equipment. Other

major elements of the commission also included installing the passive components for the voice and data network, with a total of 4500 connections, as well as integrating the various elements and connecting them to the BMW Group central control room.

Fire protection, revolutionary but invisible

About 3000 automatic and manually operated fire sensors were installed throughout the building for early fire detection. One of the most challenging aspects of this project was to provide the highest possible level of security without intruding on the superb architecture of the BMW Welt building. Accordingly, the specially designed smoke detector 500 series were used in particularly sensitive areas. The special feature of these systems is that they can be flush-mounted into the ceiling and their colour can be adapted to match their surroundings, in this case the stainless steel ceilings of BMW Welt.

Flush mounting is made possible by a fascinating, ground-breaking new technology: unlike conventional fire alarm systems, the smoke detector 500 series units do not use an internal measurement chamber. Instead, they detect smoke through two measuring tracks which are arranged outside of the housing. The detectors are also equipped with a gas sensor, which detects the carbon monoxide that is generated in fires. Since the measurement chamber was no longer needed, the housing could be made extremely compact.

Besides the fire alarm system, Bosch also installed a full-coverage robbery and intrusion alarm system in BMW Welt. With more than 400 alarm units, this system not only protects the Event and Delivery Center from unwelcome visitors, but also ensures that welcome guests do not stray from the public areas. For example, some parts of the center are reserved for people who are taking delivery of their vehicles; others are open only to company employees. In order to ensure that the security staff always has a clear view of the entire facility, video cameras have been installed on and in the building, and these are also controlled from a central control room.

Rapid evacuation assured

All signals from both the fire and the robbery and intrusion alarm systems are forwarded to a total of four universal security systems (UGM), which represent the heart of the entire security network. When an alarm is sounded, these systems initiate numerous lifesaving measures, including alerting the police and firefighters. For example, if a fire is detected, the more than 80 emergency exit doors are made accessible automatically so that the building can be evacuated quickly and efficiently. At the same time, a Praesideo public address system with 1800 integrated loudspeakers distributed throughout the building ensures that employees are visitors receive complete, reliable information at all times.

Just in time

When Bosch Sicherheitssysteme GmbH won the contract to install the wireless signalling and communication systems and the security network in December 2004, the concrete in the basement levels of BMW Welt had already been poured. Work on laying the first cables began just a month after the contract was awarded – and from then on the systems and signalling equipment were installed as construction progressed. On June 30, 2007, testing began on the entire installation, and was completed without a hitch. The security network was handed over to the BMW Group in time for the official opening on October 17. IFP

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Prysmian's FP Plus is evolving

PRYSMIAN CABLES & SYSTEMS is introducing a new generation of FP Plus cable to its enhanced fire performance range.

Highly durable and dressable, easy to terminate, with enhanced Insudite insulation giving increased damage resistance, and improved handling properties, the new FP Plus cable offers the same ease of installation and bending performance as Prysmian's market-leading FP200 Gold. It remains fully compliant with all the requirements for enhanced cables approved for fire detection and fire alarm critical signal paths in BS5839-1:2002 enhanced application areas, voice alarm systems to BS5839-8:1998 (Amd 2006) and emergency lighting systems to BS5266-1:2005.

Its dressable design makes new generation FP Plus even easier to handle and those who are familiar with Prysmian's popular FP200 Gold will notice the similarity in bending quality and general handling. Retaining its ease of termination, FP Plus is free of potentially hazardous glass tapes making installation quick and safe. No glass tapes also means no hazardous waste so disposal of off-cuts easy too.

New generation FP Plus is manufactured with enhanced Insudite insulation which increases damage resistance creating a highly durable cable.

It has been independently verified by UK certification bodies BASEC and LPCB, reinforcing its performance and reliability.

Julie Mould, marketing manager at Prysmian explains, "FP200 Gold sets the benchmark in terms of product handling as far as our customers are concerned and we've responded to this feedback in developing new generation enhanced FP Plus. As manufacturing and materials technologies progress, we're constantly seeking ways to improve and enhance product design and performance through a programme of continuous product development and innovation."

For further information visit www.fpcables.co.uk or contact Prysmian's marketing department on 023 8029 5029 or email cables.marketing@prysmian.com

New FIA website goes live

The FIRE INDUSTRY ASSOCIATION (FIA) has launched a new website (www.fia.uk.com) which is set to become an invaluable point of reference for anybody involved in the fire protection industry.

The website was developed in response to the formation of the new trade association, created earlier in the year from the amalgamation of the BFPSA (British Fire Protection Systems Association) and FETA (Fire Extinguishing Trades Association). www.fia.uk.com replaces the two old association websites – FETA and BFPSA.

The new site is packed with new features providing benefits to both members and the general public alike. Visitors to the site will be able to use the secure payment facility allowing them to book and pay online for training courses and events, as well as purchasing publications such as fire safety log books and market research reports. The search facility, enabling prospective customers to find details of members for their fire safety systems and services, has been streamlined and a new section giving meanings to the hundreds of acronyms used in the industry and expanded FAQ pages will be a boon to visitors, as will the facility to sign up to "breaking news" which will automatically send emails on topical news items. The members section has been completely revamped and expanded. Members will now have a unique password giving them access, amongst other things, to a document library where they can access reports, minutes, meeting agendas and other information pertinent to their activities within the FIA.

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Fax: 020 8547 1564
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Website: www.fia.uk.com

RJA announces opening of Dubai Office

ROLF JENSEN & ASSOCIATES is pleased to announce the opening of our Dubai office. RJA is excited to be involved in the growth of this region and is committed to being a key player in the development of the Middle East. Dubai, a hub of exciting progress and advancement, is a key location that will allow RJA to best serve its clients throughout the area.

"We have seen first hand the rapid development of Dubai and the surrounding area. Through our work on Burj Dubai, the world's tallest building, RJA has created a name for itself as a premier global provider of fire protection and life safety in this region. The opening of the Dubai office is the culmination of hard work, dedication and a desire to play a larger role in the exciting development of this region", said Martin H. Reiss, P.E., President and CEO of The RJA Group, Inc.

James H. Antell AIA, P.E., Senior Vice President of International for RJA, has spearheaded the efforts into the Middle Eastern market. Based in the RJA Chicago office, Mr. Antell has over 25 years of experience advising design teams and building owners on compliance with local and international fire safety codes and standards. His global high-rise fire engineering experience includes many of the world's tallest structures including projects in the U.S., Asia and the Middle East. He will oversee the operations of RJA/Dubai. Mr. Antell can be reached by email (jantell@rjagroup.com) or phone (312 879 7200).

Shamim Rashid-Sumar is the onsite contact for the RJA/Dubai office. Ms. Rashid-Sumar has been with the firm since 2001, most recently working as a Consultant in the Baltimore area office. She brings a wealth of experience in code and drawing review, specifications, fire protection evaluations, and fire modeling. A member of NFPA and SPFE, Ms. Rashid-Sumar has her Masters in Fire Protection Engineering from the University of Maryland. She can be reached by email (ssumar@rjagroup.com) or phone (+ 971 4 801 9270).

About Rolf Jensen & Associates, Inc.
Rolf Jensen & Associates is part of The RJA Group, Inc. We are a world leader in fire protection consulting including code analysis, fire/smoke/egress modeling, performance-based design and life safety construction management. Our sister company, Sako & Associates, provides value-added consulting services in security and media technology. Together, we can offer our clients seamlessly integrated solutions for all their fire protection and security challenges.

To learn more about Rolf Jensen & Associates, call toll-free 888-831-4RJA or visit our website at www.rjainc.com


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Road Tunnel Protection by Water Based Fire Fighting Systems:

Implementation of Full Scale Fire Test Results into Actual Projects

By Max Lakkonen, Stefan Kratzmeir, Till Bremke and Dirk Sprakel

Truck fires in a tunnel may create heat release rates (HRR) significantly higher than 100 MW. Due to the fast spread of smoke and heat, as experienced in several incidents in tunnels, the self-rescuing period in many cases therefore is extremely limited. Furthermore, it was experienced that fire fighters may not be able to approach the fire due to heat, radiation and smoke.

The consequence is a "free burn" of the fire resulting in an often rapid spread to adjacent vehicles. In recent incidents it was reported that the fire was able to jump over distances of more than 50m. Tunnels are not only damaged severely, but the repair work often causes long closing times in such extreme cases. The closing time might be so long that the direct costs for the actual repair work even can be insignificant compared to the indirect economic losses. For example the indirect economic loss was estimated to be as high as €390 million, as consequence of the Mont-Blanc Tunnel Fire (1999). The tunnel was closed for three years.

These experiences made fire protection and tunnel experts re-think traditional safety concepts up to this time used throughout Europe. The concern was raised, whether it still would be acceptable to rather design a tunnel to withstand extreme temperatures over relatively long times and to increase the size of the fire by the emergency ventilation in spite of fighting the fire in the first place.

LA Fire Tunnel Fire on Golden State Freeway (10/14/2007), source: "news limited"

Common practice in other countries

In other parts of the world this strategy has already been well applied for a long time: Since the nineteen-sixties fixed fire fighting systems – so called deluge systems – have been used in Japanese and Australian road tunnels very successfully.

European research work

Based on this positive experience several research projects were carried out in Europe over the last decade to evaluate the ability of such fixed fire fighting systems in a first step, and to further increase their effectiveness in a second step. The integration of these mitigation measures into an overall tunnel safety concept as well as the optimising of the related costs were important tasks of this work.

A major driving factor for these costly activities was that experts, as the MIT in their internet news bulletin (MIT "news office", April 1999), acknowledged that possible economic losses due to fires in tunnels can be so enormous that related research costs are negligible in comparison.

UPTUN Research Project – Upgrading of Existing Tunnels

In the UPTUN Project (see: www.uptun.net, refer for details also to IFP issue 29, February 2007.), funded by the European Commission, a consortium of 41 expert organisations investigated various fire safety aspects related to tunnels. As part of this work full size fire tests were carried out in a test tunnel as well as in a real highway tunnel. Among others, the aim was to better understand the basic mechanisms of fixed fire fighting systems in tunnels, to evaluate the interaction with other safety measures and to generate minimum requirements for actual installations. One of the outstanding results of the UPTUN Project is the "UPTUN Guidance 251 for Water Based Fire Fighting Systems for Underground Facilities", which is providing information how to design, install, and to maintain such systems.

SOLIT: Safety of Life in Tunnels

The second major research project in Europe concerning fixed fire fighting systems for tunnels is SOLIT (see: www.SOLIT.info). Results from the UPTUN Project and others were the basis for the public funded SOLIT project. The scope of SOLIT was not only to further study the effects of water based fire suppression systems, but also to further investigate their interaction with other safety systems, such as fire detection, passive fire protection or ventilation. The integration of active fire suppression systems into a holistic tunnel safety approach was part of the work program. Again, numerous expert organisations have been part of this project. The project was guided by a scientific advisory board containing specialists in tunnel safety from various countries.

An extensive test program with a large number of pool, truck and car fires was the core of work. Fire loads with potential heat release rates (HRR) as high as up to 200MW were used. To make tests repeatable and the generated data usable for scientific research, the various types of fire load were standardised in the form of clearly defined mock ups. All tests were carried out in a dedicated test tunnel during 2006. The German state owned research establishment "Institute of the Fire

Measuring Equipment during SOLIT fire tests. © FOGTEC

Spray test in M30 tunnel, Madrid. © FOGTEC

Brigades" having been involved in Water Mist Technology for more than 30 years was responsible for the generation of all measurements including temperatures, oxygen, CO, CO_2, visibility, and others. As already during the UPTUN project, this involvement of independent research experts made it possible to generate data independent from commercially active parties, thus providing an ideal basis for also future research work.

Testing with fire brigade

In the past often concerns were raised that water based fixed fire fighting systems in tunnels may be effective against fires, but that they would disable fire brigade personnel to approach the fire due to negative effects of water vapour. During a two week test series carried out by FOGTEC, Germany with the Fire Brigade of Madrid various scenarios of possible fire incidents in a tunnel were simulated by full size fires. These beforehand clearly defined scenarios were used to evaluate various strategies of fire brigades how to approach the test fires while a water based fire fighting system was operating or was shut off at pre-defined times. Also here it turned out that especially with bigger fires the sharp limitation of both, the fire growths and the temperatures, considerably enhanced the environment in the tunnel and thus better protected the fire brigade personnel.

Findings from research work

A vast amount of data was systematically generated during the aforementioned research projects. But it was most important to proof that water based fire fighting systems are able to control heat release rates of fires to an extend that the survivability is improved significantly. Temperatures can be reduced dramatically. Hazardous effects of toxic smoke on people are reduced and due to the lower temperatures and less radiation, fire brigade personnel can approach the scene in most cases significantly safer and faster. Furthermore, the fire spread will be reduced and the thermal effect on the tunnel's structure is equally reduced.

Looking at the overall safety concept, it is an important finding, that due to positive interactions with the ventilation system, the effectiveness of such – longitudinal as well as semi-transversal ventilation – can be increased significantly.

The positive effects in regard to the protection of the tunnel users and emergency forces is already in many cases a good enough reason to vote for the use of water based fire fighting systems. The better protection of the tunnel itself and by this the limitation of direct and indirect losses suffered by the society is another important reason to use this active type of protection. In addition to these reasons, savings in other protection measures – when installing a water based fire fighting system – may make it even more cost effective to go this way.

Change in safety strategy

As the consequence of these and other research works the general opinion among experts concerning fixed fire fighting systems in tunnels has turned much to the positive over the last years.

German STUVA for example is looking at fire suppression systems as part of a "suitable safety" concept for a forward-looking tunnel fire protection.

In his keynote address on the occasion of the 2007 STUVA Conference in Cologne, Germany, Prof. Alfred Haack, Executive Board member of the STUVA (Research Association for Underground Transportation Facilities) pointed out, that "considerable research has been carried out", which concluded, that although automatic fire suppression systems are "not capable of extinguishing a . . . fire", but that "if properly designed and immediately activated they are for instance capable to reduce the effects of a lorry fire". Further more


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Table A.10.5.1 – NFPA 502

Vehicles	Peak Fire Heat-Release Rates (MW)
Passenger car	5-10
Multiple passenger car (2-4 vehicles)	10-20
Bus	20-20
Heavy goods truck	70-200
Tanker	200-300

he stated that “in the first place equipment and tunnel-structure would be better protected.” At last he remarked that “the smoke release rate is substantially reduced and the spreading of smoke delayed” . . . and “the risk of a fire jump from vehicle to vehicle largely precluded.” Ultimately Prof. Haack pointed out, that an automatic fire suppression system would “enable the fire and rescue service to reach the seat of the fire, where self and third-party rescue of affected tunnel users would be facilitated.”

Another reason for the change in thinking is that over time the figures for expected fire loads in tunnels especially for Heavy Goods Vehicles (HGV) have been increased considerably. This happened as a result of recent research and actual incidents. Fire catastrophes like in the tunnels of Mont-Blanc and St. Gotthard have revealed the danger of HGV fires. Both PIARC and NFPA have adjusted the expected HRR for such fires. The latest “NFPA 502 – Standard for Road Tunnels, Bridges, and Other Limited Access Highways (2008)” edition shows a revised list of the expected values of HRR.

The shown values make it for many experts questionable, whether such fire sizes still should be accepted to develop uncontrolled in an incident, or whether suitable technologies should be applied to at least limit the size of fires. A positive thinking about this approach can be increasingly found within fire brigades as well. The new NFPA 502 document of 2007/8 even states, that “it is now acknowledged that water-based fixed fire-fighting systems are highly regarded by fire protection professionals and fire fighters. . .”

System layout and design

The findings from fire tests in various tunnels showed that in all cases the design parameters for a particular tunnel must be in line with the parameters tested. This especially refers to the expected fire loads and the height of the nozzles relative to the fire load. Therefore specific testing may be needed for specific tunnels in case that e.g. the design of the tunnel does not allow installing nozzles in the same position as tested previously. Further general requirements are provided in the aforementioned UPTUN guidance 251.

Actual installations

As a direct result of the positive outcome of the afore described research work and the overall change in the protection philosophy several tunnels were actually equipped with water based fire fighting systems. This new generation of fixed fire fighting systems for tunnels is mainly based on High Pressure Water Mist and consumes only about 20% of the water required by traditional systems.

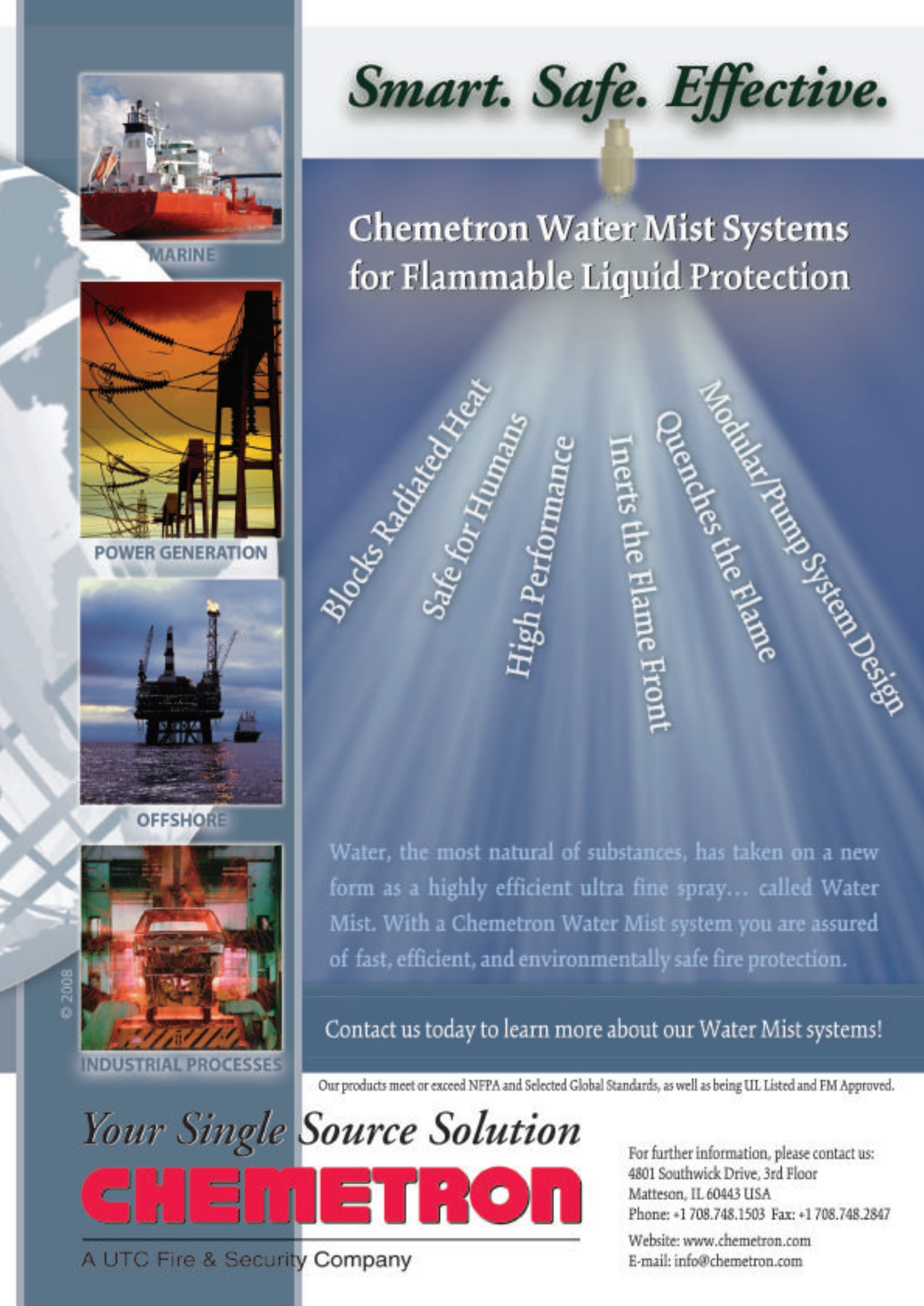
M30 tunnels of Madrid

Based on dedicated full size fire testing a water mist system supplied by FOGTEC was applied into several parts of the M30 tunnels in Madrid, Spain between 2006 and 2007. As a basic principle the equipment and systems engineering comply with the UPTUN 251 guidance, recommending minimum standards for water based fire suppression systems in tunnels.

As of today FOGTEC is protecting sections in the M30 tunnels with a length of approx. 2.1km of the road tunnels. In some sections three levels of the tunnels are protected. The largest protected sections consist of five parallel road lanes with an overall tunnel width of 22 meters. In addition FOGTEC systems were chosen for 34 out of a total of 36 underground facilities connected to the main tunnel, and containing technical equipment such as control systems, change over facilities, computer rooms etc.

The tunnels are protected by open nozzles

Water Mist control unit for M30 tunnels, Madrid. © FOGTEC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Silver Forest Tunnel, Moscow. © FOGTEC

grouped into sections. These are activated via the overall tunnel control system making use of a BUS system. A separate control unit in the main control room and several PLC sub-stations are integrated. The control system is built up in a redundant way to enable control of the fire suppression system also in cases of a break down of the main controls.

The activation can be triggered either automatically by a linear heat detection system or manually from various locations. Special deluge valves provide easy and cost effective maintenance possibilities ensuring minimal traffic interruptions during maintenance work. The valves are installed in the upper part of the tunnels for protection against vehicles involved in an accident. Two separate pumping stations with water reservoirs further increase the availability of the system. The individual pumps installed are sized to minimise the number of pumps, thus reducing moving parts and thereby possible failures and maintenance work.

Recently the systems successfully passed the acceptance test for this project by carrying out spray tests in dedicated parts of the tunnels. In the presence of personnel of the tunnel owner and the main contractor Dragados the performance of the system including the related controls was demonstrated.

Silver Forest Tunnel of Moscow

Late in 2006 FOGTEC was awarded the order to protect the complete tunnels of the Silver Forest Tunnel in the heart of Moscow, Russia with a Water Mist System.

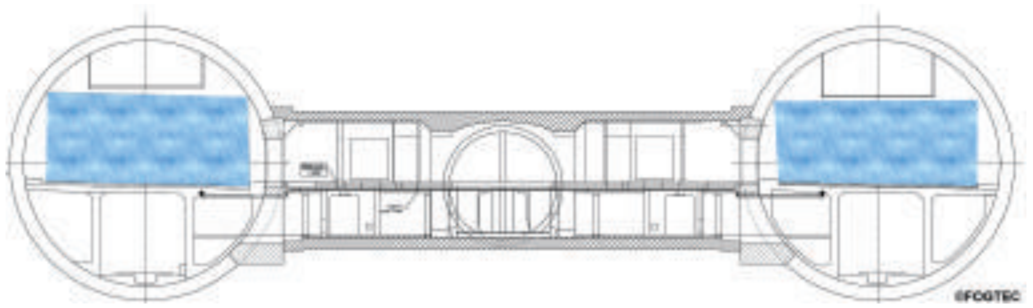
The tunnel consists of two parallel borings (each with a diameter of 14.2m) providing space for Metro rails in the lower and road ways in the upper parts. Both borings of the tunnel will be protected in the road way parts with a FOGTEC water mist system over a total length of more than 4,000m.

In this case motorised deluge valves are positioned in separate service tunnels being out of the reach of uncontrolled vehicles. The concept of two separate pumping stations has been applied respectively. Open nozzles installed in sections of 33m guarantee safe activation in the relevant parts. Up to three sections can be activated simultaneously. For protection against freezing insulation – in combination with a heating system – is being installed for the piping system. The installation is right now in progress.

The design criteria for the tunnel have been derived from the results generated in the UPTUN and the SOLIT research projects.

Virgolo tunnels

The Virgolo Tunnels are part of the Brenner Highway in the Alps. Two tunnels each with a length of about one kilometre contain two lane road ways. The piping for the open nozzles has been integrated into the installation of other equipment such as lightning. Diesel driven pump units provide the required flow independent from an external power supply. IFP



Silver Forest Tunnel in Moscow

CONFERENCE ON FIRE SUPPRESSION IN TUNNELS

An event specifically focusing on fire suppression systems in tunnels is being held on April the 2nd and 3rd in Munich, Germany. The conference language is English with simultaneous translation to other languages. It will be hosted in co-operation between the International Water Association and COSUF (Committee on Operational Safety of Underground Facilities, a subgroup of the International Tunnel Association ITA). See for details www.iwma.net

FOGTEC, the Company

FOGTEC is a specialist for Water Mist Systems. The company has specialized in a number of applications such as tunnels, trains, buildings and industrial risks. Starting from consulting services and customer related research work FOGTEC offers turn key installations on an international scale in co-operation with local specialist companies.

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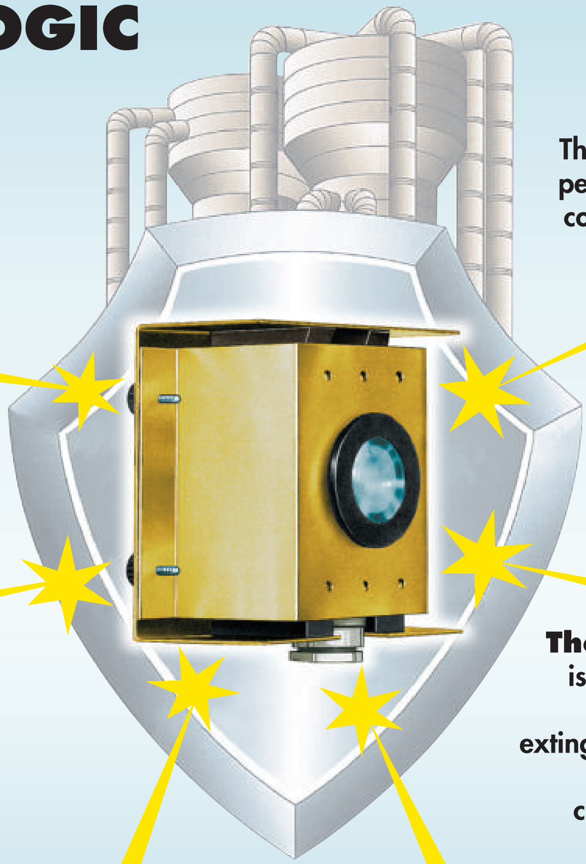

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Keeping Safe With Gas Detection Equipment

Even if firefighters were to wear breathing apparatus on every single shout, there would still be a need for gas detection. Gases, particularly those often found in chemical or industrial plants, can have a far reaching effect, from poisoning nearby personnel to causing widespread environmental pollution. Depending on the hazards involved, a spark or other source of ignition could also have explosive consequences, and entry into a potentially lethal atmosphere by unprotected personnel could prove to be lethal.

By Ian White

Draeger Safety

Unlike smoke and flames which are relatively easy to see, toxic and flammable gases are usually invisible to the naked eye. They can also be complex in their configuration and may be the result of more than one process resulting in combination gases and a different kind of danger. For this reason, firefighters need to assess what it is they are dealing with, as quickly as possible. Once armed with the facts, they can respond to the numerous challenges that arise both quickly and competently.

Defining the problem

Firefighters have a need for rapid and accurate information about the nature of an incident. The use of the right gas detection system can quickly determine the type and level of the substances involved, thereby helping to eliminate the risks and increasing awareness of the dangers they are likely to face.

Whilst the nature of the incident can sometimes point to the type of hazard that might be found, nothing can replace the certainty that comes with reliable, accurate air monitoring.

For instance, an earthquake or other natural disaster might immediately point to town gas and methane but it could also cause exposure to hydrogen sulphide, sulphur dioxide, carbon monoxide. It could also mean a lack of oxygen altogether! In the same way, a terrorist incident might feature nuclear, biological or chemical hazards, whilst an industrial accident might involve a number of combination hazards.

In the brewing industry, for example, increased levels of nitrogen are used to make a more effervescent beer and, as a result, there is a risk of oxygen depletion which, in turn, could lead to asphyxiation. In hospitals, laboratories and universities, liquid nitrogen is used as a freezing agent. Colourless, inert and odourless, this substance can, in enclosed areas and confined spaces, cause severe oxygen deprivation.

Steelworks bring a different set of potential hazards with a potentially volatile mix of oxygen and carbon monoxide creating serious blast levels. Responding to an incident at a food processing plant could involve high levels of disinfectants or high levels of ammonia in refrigeration and cold storage areas. Even in the relatively "safe" semi-conductor industry, the use of ammonia, arsine and bromine can bring its own toxicity problems.

To compound the problem, it is also possible that toxic and/or flammable gases and vapours that were created during a previous application may still be present, or that hazardous bi-products may be created by the fire itself from otherwise non-hazardous materials.

Whilst not exhaustive, the following lists some of the most common substances that may be encountered:

SOURCE	SUBSTANCE
Combustion processes such as open fire, tobacco smoke. Vehicle exhaust gas	CO_2, CO, Nox
Cleaning agents, disinfectants, furniture polish, stain removers, shoe polish spray, nail polish remover, correction liquids, pickling agents	Toluene and aromatics, hexane and aliphatic hydrocarbons, formaldehyde, other aldehydes
Glues and Paints	Toluene and aromatics, hexane and aliphatic hydrocarbons, formaldehyde, other aldehydes
Insulating material, foams, damping material, chipboards	Styrene, formaldehyde
Gasoline/petrol stations	Toluene, benzene and other aromatics, hexane and other aliphatic hydrocarbons
Refrigerants, anti-oxidant in metal furnaces	Ammonia
Food processing, magnesium foundries	Sulphur dioxide
Semi-conductor manufacture and rework	Ammonia, bromine, hydrogen chloride, hydrogen cyanide
Paper and man-made fibres	Chlorine
Decomposing and biological matter	Methane, H_2S, oxygen deficiency
Dry cleaning and degreasing	Tetrachloroethylene

The effects of these substances are varied and are obviously dependent upon the levels of concentration involved. In broad terms, the substances can be categorised as either simple or chemical asphyxiants, irritants or narcotics:

Simple asphyxiants such as carbon dioxide (CO_2) are not usually life-threatening but their presence can displace oxygen in the air to such an extent that the lack of oxygen can, in itself, be dangerous. Whilst low levels of CO_2 might cause breathlessness, high concentrations can lead to a loss of consciousness within just 60 seconds.

Chemical asphyxiants such as carbon monoxide (CO) and hydrogen sulphide (H_2S) can be immediately dangerous to life and health in that they interfere with the transportation of oxygen within the body. Symptoms might include giddiness and headaches before eventual collapse, and exposure to a high concentration of H_2S can paralyse the respiratory system immediately.

Exposure to Irritants such as ammonia, chlorine and sulphur dioxide can cause ulceration to the throat, watering eyes, sneezing and coughing. Where escape is difficult and exposure is prolonged, breathing can become so severely restricted that it could prove to be fatal.

Hallucinations can follow exposure to high concentrations of Narcotics such as toluene and tetrachloroethylene.

Looking at portable solutions

Regardless of whether there are single or multiple gas hazards involved, there is more to the selection of gas monitors than hazard detection. The type of incident, as well as the method of working, must also be carefully considered. For example, if two hands are required to carry out a task, can the portable detector be worn around the neck? If gloves are worn and a handheld system is being used, can the instrument still be operated easily and efficiently? Is data logging required? Can the display be seen in poor light? Will it work in hot and humid atmospheres? Is it intrinsically safe? Other questions that spring to mind might include:

Which alarms are available?

The better units combine vibrational with visual and two-tone audible alarms which are activated as soon as the threshold levels are reached. This is particularly important for firefighters who may be working in poor light and very noisy environments.

How easy is it to configure, calibrate and download an event logger?

These functions can all be easily and quickly carried out via an infra-red (IR) interface. If records need to be kept, this is an important feature.

What about the reaction time of the sensors and how often is maintenance required?

The latest electrochemical sensors respond immediately to any gas hazard and can offer maintenance free operation for up to five years.

Will the unit still work reliably if it is accidentally placed in a jacket pocket?

Units such as the Draeger X-am 2000 have gas inlets on both the top and front to ensure that,

even if this were the case, it will still provide reliable warning against gas hazards.

Is performance affected by the small size of a unit?
Some units can be as small as a mobile phone. By using the latest, miniaturised sensors such as the XXS generation from Draeger, gas detectors can retain their powerful functionality and still incorporate two-button control panels, a large liquid crystal display and easy menu guidance.

What should be used where explosive hazards might be involved?
For improved safety when facing unknown hazards, some units incorporate a catalytic Ex sensor which, when calibrated to methane and other substances, responds quickly to explosive gases and immediately warns the user.

Portable systems that are suitable for use by firefighters include short term tubes as well as personal single and multi-gas monitors.

Tubes
Providing on the spot measurement, short term tubes are suitable for monitoring personal exposure, spot check measurements, leak checks and confined space investigation. The Draeger-Tube range, for instance, enables fast, accurate measurement of over 500 different types of gases and vapours and can be used with hand bellow pumps which enable rapid measurements to be taken with optimum volume and flow specifications.

Spot measurements can also be easily carried out with the Draeger Chip Measurement System (CMS), a portable, multi-gas detection system that requires minimal user training and which provides an immediate true digital readout.

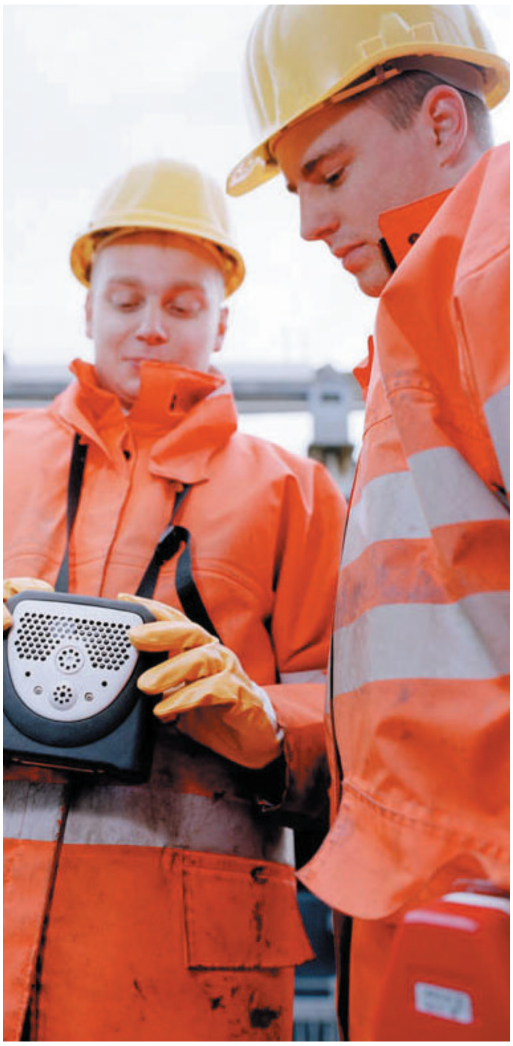
Personal Single Gas Monitors
Simple to use, these instruments can be handheld or clipped to the user via a crocodile clip. Often available with an additional neckstrap, they can monitor a broad range of gases and provide an immediate, clear visual display of gas concentrations. They can also provide audible, vibrational and visual alarms when danger levels are reached. By way of example, the fast response, pocket-sized Draeger Pac 7000 is tailor-made for constant use and incorporates the new, longer life Draeger XXS sensors. Offering a high level of reliability and fast warning against harmful concentrations of a wide variety of gases such as carbon monoxide, hydrogen sulphide or oxygen, it can also transmit data via an IR interface.

Multi-Gas Monitors
High performance, modern units such as the Draeger X-am 7000 can provide continuous detection of up to five gases simultaneously, and feature individually adjustable visual and acoustic alarms. A choice of over 25 sensors is offered with this particular unit and, because each sensor is pre-calibrated and is recognised automatically by the instrument, this innovative instrument can be reconfigured simply by changing a sensor, without requiring additional service or maintenance. In addition, the measuring range of these sensors can be changed to any other gas detected by that sensor, by the push of a button and without needing recalibration. This means that the accuracy and range of the monitored substance is substantially increased.

Other instruments are available for use where combination hazards involving explosive gases and a lack or surplus of oxygen may exist. As small as a mobile phone, for instance, the Draeger X-am 2000 is one of a new generation of gas detectors which have been specially designed for personal monitoring use. Offering reliable measurement of combustible gases and vapours as well as oxygen, carbon monoxide and hydrogen sulphide, this 1 to 4 gas detector is the perfect companion in any gas sensitive area. For improved safety when facing unknown hazards, the catalytic Ex sensor, calibrated to methane, responds quickly to explosive gases. Offering a high level of sensitivity to combustible organic vapours it also ensures dependable warnings in the event of explosive hazards.

Ergonomically designed and easy to use, this lightweight unit features the latest miniaturised XXS generation of powerful electrochemical DraegerSensors. With a practical two-button control panel and straightforward menu guidance system, it benefits from a large liquid crystal display which provides all readings at a glance. Fitted with a crocodile clip for secure attachment to clothing, it incorporates gas inlets on both the top and front to ensure that, even if it is accidentally placed in a jacket pocket, it will still provide a reliable warning against gas hazards.

For many firefighters, the issue of domestic preparedness and the threats associated with chemical and biological agents have been brought to the fore in recent times. Providing continuous measurement in real-time, the Draeger Multi-IMS, for instance, is easy to use and will quickly detect a wide range of chemical warfare agents. Incorporating a sensor based on Open Loop Ion Mobility Spectrometry, it utilises an ION Mobility



Cell to provide improved sensitivity and selectivity. Concentration, trend and relative dosage measurements are easily taken and a range of graphical alarms indicates both the substance and concentration level as well as the hazard type, i.e. nerve, blister or blood/choking agent. Bar graph displays clearly show the current concentration levels as well as alarm volume and battery status. With a built-in pump and RS232 datalogging interface, it also features audible and visual alarms and an automatic self-check.

Photo ionisation detectors (PID) are perfect for tracing volatile organic substances in air. Able to detect whole groups of substances, these multi-functional, robust instruments can also be calibrated to monitor individual hazards. Especially useful in confined space measurements and emissions monitoring, they can also assist in fire investigation and in post-accident screening.

Fixed Gas Detection Systems

Many industrial processing plants and utilities organisations are given round the clock protection with fixed gas detection systems. Designed to constantly monitor and detect explosive or toxic gases and vapours as well as oxygen deficiency and/or enrichment, these sophisticated systems can be used to sound alarms and initiate evacuation, or to switch off entire processes in the event of a problem.

Used to monitor specific areas as well as remote and/or multiple sites, their data can also be recorded which means that they can provide valuable incident information before firefighters arrive at the scene.

Incorporating HART technology, Draeger REGARD Controllers, for instance, are often used in conjunction with Polytron infra-red, explosion proof and open path transmitters in applications where fail-safe protection is required. Designed for use under the toughest conditions, they are also protected against RFI, high vibration, shock and corrosion and can provide accurate information that firefighters can both rely and act upon.

The Draeger Safety division offers products, services and system solutions for all encompassing Risk Management such as personal and facility protection. Customised system solutions include workshops, training and breathing gas management systems, diving, rescue and high temperature training systems, and tunnel rescue trains. IFP

Further information is available from:

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Blyth
Northumberland NE24 4RG
Tel: 01670 352891
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Detecting a New Tomorrow

Hochiki Chosen to Protect New London Eurostar Terminus

The stunning new Eurostar terminus at St Pancras International in London bristles with the latest high-performance fire detection and alarm technology, including no fewer than 5,000 Hochiki Europe sensors and sounders. Here, Graham Lowe, UK Sales Manager, goes behind the Victorian building's public façade to reveal what has been put in place to safeguard passengers and staff alike.

By Graham Lowe

UK Sales Manager,
Hochiki Europe

St Pancras station has been part of Britain's railways heritage for the better part of 150 years. Designed by William Barlow in 1863, it gained instant fame for its "Barlow Shed" train shed arch that spans 73 metres and is over 30 metres high at its apex; at the time, the largest enclosed space in the world. The Grade 1 listed red brick Gothic landmark façade fronting the station was the result of an architectural competition in 1865 and became the Midland Grand Hotel. In 1935, the hotel was closed and the building became railway offices, renamed as the St Pancras Chambers.

The station's restoration, remodelling and extension represents the last building block in the London-to-Paris high speed rail link that really got underway back in 1987 when work started on the Channel Tunnel. It will ultimately be used by over 45 million travellers every year, cutting the journey time from London to Paris to two-and-a-quarter hours on the new 186mph High Speed 1 – until November 2006 know as CTRL – dedicated line.

One of the largest transport hubs in Europe, St Pancras International now has 13 platforms, six of which are around one kilometre long and are devoted to international Eurostar services. The rejuvenated and remodelled station also now incorporates 47 retail outlets and designer boutiques on the undercroft, plus stylish Eurostar arrivals and departure lounges, and a further ten shops on the station platform level. It also boasts a daily farmers' market and, at 90 metres, the longest champagne bar in Europe. However, thanks to careful attention to detail and a sensitive understanding of the architectural importance of

the National Heritage building, St Pancras International remains one of the greatest Victorian buildings in London.

Fast and reliable solution

System design and product selection, installation, testing and commissioning of the new and extensive fire safety solution for the station was undertaken by the Infrastructure and Rail Services division of EMCOR in a joint venture with Costain, O'Rouke and Bachy, under the CORBER banner, as part of its £310 million contract with Rail Link Engineering for the refurbishment of St Pancras International. The team was headed by Peter Patrick, head of EMCOR's fire division and an expert at undertaking major infrastructure capital projects such as the Jubilee Line project who, on this contract, managed four project managers, five commissioning engineers and more than 50 electricians.

In total, 5,000 Hochiki ESP – Enhanced System Protocol – analogue addressable devices have been installed throughout the entire site – with the exception of a few small retail outlets – on 14 Kentec Electronics' Syncro control panels and repeaters. A variety of Hochiki devices were selected, each chosen for its proven ability to combat particular fire risks in the huge multi-activity station. They included optical smoke sensors for back office and main passenger concourse areas; multi-sensors for more challenging environments such as plant rooms and workshops; heat detectors in kitchens and toilets; audio visual devices and base sounder beacons.

They are all automatically re-calibrated every 24 hours by the Syncro panels to compensate for any environmental contamination and to ensure that they continue to operate reliably at the specified sensitivity. Indeed, a key factor cited by Peter Patrick for the decision to opt for the Hochiki/Kentec solution was that Kentec panels are fully compatible with all of Hochiki's ESP protocol devices, and are configured to share system information and event details on a highly fault-tolerant secure network.

The success of the installation can be judged by the fact that the same solutions have been adopted by the EMCOR team to protect all of Phase Two of the Channel Tunnel Rail Link project that includes 29 portals, shafts and technical buildings, two main train depots at Ashford and Ramsgate, and two other new stations on the UK side of the London-to-Paris rail link. These are the new Ebbsfleet International Station near Dartford in Kent, and the new Stratford International Station near the City and Canary Wharf that is also central to the 2012 Olympic transport strategy, with forecasted passenger volumes of 25,000 a day to and from the Olympic Games' venues. This has resulted in more than 10,000 Hochiki devices being used

on Phase Two, controlled by more than 50 Kentec control and indication panels.

However, technical performance was not the only consideration with which Peter Patrick had to contend. He comments: "We had to take great care when installing the fire detection equipment, as it was vital to minimise any adverse aesthetic impact on the highly decorative Victorian architecture." He continues: "Another major challenge was the need to install the new system in a station that was to remain open and be used daily by thousands of passengers. So the fire safety system had to be fully functional at all times."

Error-free detection

The installation is managed in the station's main control room where, around the clock, a 1.2-metre LCD screen displays the entire station and its fire detection system. This can provide an overview of the whole installation, or drill-down to show various levels of detail; if necessary pinpointing information on any specific device. If, for example, a fire is signalled, the precise location can be viewed on screen, and devices can be interrogated and, if necessary, isolated. The screen can even display the best evacuation routes.

With huge numbers of people converging on the station's platforms at peak travel times, and the travelling public's ever-present concerns regarding terrorist activities, ensuring the minimum disruption from false alarms was a paramount consideration. In the event of a confirmed fire, the Syncro system directly controls and monitors the station's voice evacuation system, which is audible in all of the station's public areas. However, in places where high levels of ambient noise may make it difficult to hear voice alarms, such as toilets, beacons are also fitted.

Two other key features further minimise any risk of false alarms – data integrity and error detection. Hochiki's ESP protocol uses a combination of sophisticated algorithms that reduce data corruption. Additionally, with parity and checksum error detection principles applied to every set of data, unwanted external "noise", such as EMC interference is eliminated.

Hochiki optical smoke sensors are designed for both efficient detection and the virtual elimination of false alarms. The sensor's chamber incorporates uniquely angled baffles that ensure that internal reflections are not misinterpreted as an alarm condition. Precise positioning of the optics in the chamber enable it to also sense a wider range of fire types, so providing a more balanced response to different types of smoke particles. This is an Hochiki-developed technology that the company calls "high-performance flat response".

The sensitivity of each device is set to match the prevailing conditions using the Syncro panel's intuitive Loop Explorer configuration software. Additionally, to allow the most suitable sensing mode to be adopted for a particular environment, the multi-sensors can be set to heat only, smoke only, or thermally-enhanced smoke detection mode.

An integrated solution

The main Syncro control panel was designed and engineered to meet High Speed 1 requirements. It incorporates 196 fire zone indicators, and a number of firefighters' control switches to allow plant to be managed anywhere in the network via Hochiki loop output relays. A repeater panel, with an emergency fire telephone, has been incorporated into the system for use by the fire brigade should an emergency condition occur within the main control suite.

Summing up his thoughts on the St Pancras International project Peter Patrick says: "Over the years I have used many different fire detection devices and I can truly say that Hochiki has time and time again proved to be the most reliable and best performing of them all". He explains in more detail: "The key elements that I look for in a fire system are reliability, flexibility, good quality control, high performance and false alarm management. The last thing we need on a site such as St Pancras International is unwanted false alarms. With the synergy that has resulted from Hochiki and Kentec Electronics working together, they have delivered superior product performance and hands-on technical support."

Just as Eurostar trains speeding out of the rejuvenated St Pancras International have established Britain's credentials in world-class high speed rail travel, so too has a new European benchmark for railway station fire safety been established. So, the final words go to Peter Patrick: "When implementing a life protection system, I will not make any compromises. A robust and reliable system is what I wanted, and that is exactly what has been delivered." IFP

The remains of the Torre Windsor, Madrid after its devastating fire – access and operability of adjacent properties, roads and underground rail networks was severely affected

The Societal Impact of Fire Sprinklers

Two Fires With Very Different Outcomes

By Brendan MacGrath

Manager, International Codes and Standards Group, FM Global

At around 11 pm on a Saturday night in February 2005, a small fire started in a room on the 21st story of the Torre Windsor high-rise office building in downtown Madrid, Spain.

By morning, and despite the efforts of the permanent security staff and the professional fire brigade, the 32 storey, 100 metre high building had been fully engulfed in flames, leaving in its wake, a partially collapsed and ultimately destroyed building. Due to fears of further collapse, a 500 metre exclusion zone was established around the building. As a result, nearby commer-

The limited impact of a sprinkler-controlled fire in an office – normal operations recommenced the following day. © 2008 FM Global. Reprinted with permission. All rights reserved

cial property was forced to close for several days affecting some 30 thousand workers while the underground road, suburban and metropolitan rail networks feeding this important business district were also shutdown causing long delays to commuters. Around six million litres of water were used in the fire-fighting efforts to prevent it spreading to adjacent neighbouring properties. The estimated cost of this fire, including the insured damages to third parties, was expected to be in excess of €300 Million. Given the location, the demolition had to be carried out by a gradual dismantling of the building which resulted in continued significant disruption to the general area for a further six months. This highly publicised catastrophe was not favourable to Madrid's image as the business capital of Spain's thriving economy and an important tourism destination. And it certainly wasn't welcome in the midst of the selection process of the host city for the 2012 Olympic Games, in which Madrid was a front-running contender.

A few years earlier, again in Madrid on New Year's Day, 2002, a short circuit from an operating portable electrical heater started a fire in an unattended seven-storey office building. Unlike the Torre Windsor, however, this facility was fitted with a fire sprinkler system. Three sprinkler heads operated which successfully controlled and indeed extinguished the fire by the time the public fire brigade arrived, who had received notification thanks to the water flow alarm. An estimated 26,000 litres of sprinkler water were applied, or in other words, 230 times less than that consumed by hose streams in the Torre Windsor office fire. The estimated total loss cost was €175,000, or at least 1,700 times less than the measurable cost of the Torre Windsor fire. In this case, the staff returned to their workplace the following day as usual, without any significant interruption to their livelihoods or to those in the immediate community.

The Societal Impacts of Fire

Just last year, 2007, there were many examples of catastrophic fires right across Europe and around the globe in facilities with very different types of activities and levels of fire hazards.

In Denmark, separate fire incidents in April and July destroyed two large, pork-product processing facilities. As a result, more than 1300 workers were made redundant for the duration of the demolition, rebuilding and repairs. The can create uncertainty for workers which in turn can impact the local economy. This equally applies to the staff of those companies supplying raw materials and services to affected facility, further compounding the impact. In addition, unemployment benefit costs incurred by the state during this period can also be significant. A further aggravating factor in cases like these is the interim and even sometimes permanent closure of facilities with the relocation of jobs to another country with lower costs. Such was the fate of 200 jobs following a major fire at an electrical manufacturing plant in the UK in 2001. The plant closed and the operations were transferred to a facility in Greece. Therefore not only can such fires impact the local economy but there are also losses at a national level.

In Treviso, Italy a domestic appliance manufacturing facility employing 800 staff suffered a catastrophic fire in April. The thick black smoke emanating from the plant resulted in orders to evacuate and close nearby schools and to keep windows closed in the surrounding urban area. A local prosecutor has subsequently considered a case against the firm involved for not having taken due measures to prevent this event and its consequences.

In Atherstone-on-Stour, Warwickshire, UK in November, a fire at a vegetable goods packing and storage facility tragically claimed the lives of four fire-fighters.

The Societal Impact of Sprinklers

Each of the recent cases highlighted above had one thing in common; the buildings involved were not fitted with an automatic fire sprinkler system. Had an adequately designed, installed and maintained sprinkler system been provided, the outcome and overall impact would almost certainly have been far different. Fire sprinklers, a well proven technology, can prevent these types of catastrophes. They very effectively limit the

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A full-scale rack storage fire test at FM Global's Research Campus: such tests determine the design criteria necessary to adequately and cost-effectively protect warehouses. © 2008 FM Global. Reprinted with permission. All rights reserved

consequences of fires to minor proportions. They do this by automatically responding to and attacking fires in their early stages, limiting their size to proportions such that the responding emergency services are typically faced with the task of extinguishing a minor residual fire. Without sprinklers, more often than not, the only viable and safe alternative is to deploy defensive tactics in an attempt to prevent spread to adjacent properties, often with no appreciable impact on the building of fire origin.

This was further demonstrated to great effect one Friday evening in August 2007; following an argument with some colleagues, a disgruntled employee at an 8,000 square metre spare parts warehouse in France decided to set fire to the facility by igniting high rack storage of cartoned goods. Four sprinkler heads operated promptly which limited fire damage to one bay of the rack. All of the employees safely evacuated the building and, upon arrival, the fire brigade's task was to extinguish a small incipient-sized fire. The results: there was no reported impact to the environment, either in the form of air-borne pollutants or contaminated fire water run-off. Operations at the facility recommenced as usual the following Monday.

The main conclusion from studying and comparing the above types of incidents is clear: automatic fire sprinkler systems do prevent catastrophic events from occurring and hence, reduce and indeed often eliminate the very significant impact and consequences a fire can have beyond a property's boundary to society as a whole.

The Full Cost of Fire

While the property insurance costs of major fire events are readily quantifiable, the total economic cost and the broader impact on society, in terms of the safety of occupants and emergency services, the disruption to the community and the ensuing environmental damage is not. While further studies are planned, the "tip of the iceberg" concept, where the visible property and business interruption loss costs represent only a portion of the total impact and cost of fires to society, appears to be a valid one.

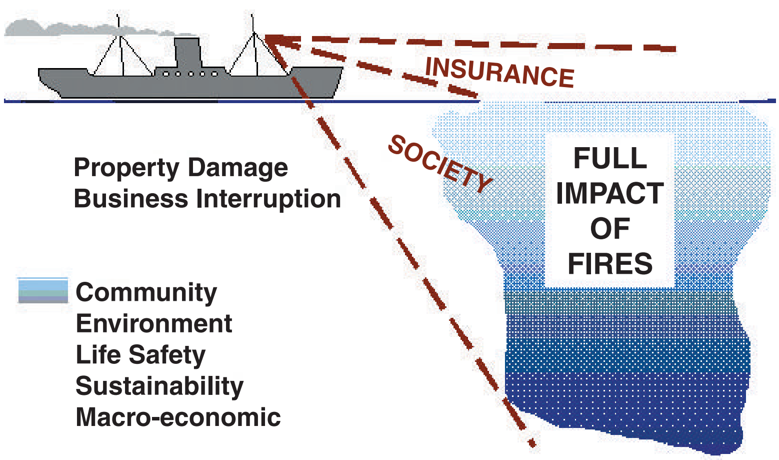
Viewed from this perspective, automatic fire sprinklers make sense. They are not just a device for the protection of properties and the assets they house, but also for people, their livelihoods, the environment, the local community, the economy and hence its sustainability.

Given both the impact of fires on today's society – estimated by several macro-economic level studies at between 1 to 2% of a country's GDP – and the potential benefits of sprinklers, it is appropriate that legislation should regulate for positive change in this area. This can be achieved through the provision of requirements and incentives in building codes for the installation of fire sprinklers in public, commercial and industrial buildings.

Regulatory Environment

It is true that there are some existing requirements for the installation of sprinklers in national building codes in Europe. These are often targeted, though, at a relatively small number of applications which are considered to be beyond the traditional and perceived abilities of the responding professional fire services. Currently, building codes mostly focus on detection and passive measures which by themselves, as demonstrated by the examples above, do not prevent major fires occurring and their ensuing societal consequences. The reality is that fire-fighting challenges have greatly increased, notably due to the increased use of plastics both in construction and also in the

The Societal Impact of Fires – Iceberg Concept



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products and materials handled in many buildings nowadays. All of this contributes to today's current environment where accessing a burning building is an extremely challenging and hazardous task. The UK's Chief Fire Officers Association (CFOA) strongly advocates the use of Automatic Water Suppression Systems (sprinklers) in potentially all premises as "these represent the single most significant aspect of a fire management program".

By requiring sprinklers per codes, this would mean that new buildings (above a certain size and fire hazard thresholds) would be provided with an automatic sprinkler system right from its inception. An adequately designed, installed and maintained sprinkler system provides the ultimate protection against the fire hazards, which are present in practically every type of building and activity. This greatly contributes to a building's resilience, sustainability and the benefits the property itself brings to society.

Cost Impact

By requiring fire sprinklers in building codes, their design and installation is significantly simpler and most importantly, cheaper. Typically, savings of around 40% are achieved when these are incorporated in to a new building's design and installed during its construction compared to retro-fitting them in an existing facility. A sprinkler system protecting an office building and its occupants can be installed for half the price of its comfort-providing carpet. Overall, sprinklers can represent as low as 1 to 2% of a new building's cost. Further savings and architectural advantages are achievable with sprinklers as these can allow relaxed requirements for internal fire-rated partitions and longer egress travel distances.

Research and data

Sprinklers are very effective in reducing the impact of fires. FM Global's fire loss data, measured in terms of property damage and business interruption costs, shows that in the 10 year period 1997 to 2007, the average fire loss to an adequately sprinklered FM Global insured location was US$ 600,000; the average fire loss to locations needing sprinklers was US$ 3.4 Million. I.e. sprinklers reduced the impact of fire losses by a factor of 5.7. Note: many successfully sprinkler-controlled fires – estimated as at least 80% – are unreported due to their loss cost being below insurance policy deductibles. Therefore, the average sprinkler-controlled fire loss value is far less and hence, this reduction in impact is even greater. And in the same way that sprinklers greatly reduce the cost of fires when measured in terms of policy-holder claims, they also greatly reduce – if not eliminate – many of the societal impacts highlighted in the examples above.

A subject of much study is the overall reliability and effectiveness of sprinklers. The above figures show how effective adequate sprinkler protection is when provided. This begs the question, how often do sprinklers systems reliably and effectively control fires? FM Global data concludes that the reliability of the most common type of sprinkler installation, a wet-pipe system, ranges between 94 and 98%. When adjusted for an estimated number of successfully yet unreported sprinkler-controlled fires, these figures increase to over 99%. This is line with the findings of other studies e.g. Marryatt, Australia (99%) and the Association of German Property Insurers' (97.9%).

Common misconceptions

Cinema films showing all the sprinklers in a building operating at once is one of the many myths associated with this safety device. Another myth is that their installation is a matter solely for insurance companies and their policy holders. The reality is that the insurance premium incentives for their installation vary widely depending on the conditions of market and the competitive pressures at any particular time. While a properly designed and installed sprinkler system will reduce both the probability and severity of a major fire, savings in insurance premiums for an individual premise will rarely justify the cost on a traditional cost/benefit analysis. Those enlightened companies that decide to install sprinklers are doing so to protect their highest value-creating assets – their business and their people – and insurance savings are a secondary consideration. However such companies will certainly benefit from better and more stable insurance premiums compared to those that do not see the value of sprinklers. Sadly, the latter approach will leave many unprotected facilities at increased risk of a major fire, with the wider economic, societal and sustainability consequences should it occur.

Those enlightened companies that decide to install sprinklers are doing so to protect their highest value-creating assets – their business and their people – and insurance savings are a secondary consideration.

Conclusion

Providing automatic sprinklers in a building protects the occupants and its activity making it a far more resilient facility and hence, makes a major contribution to sustainable development. Sprinklers protect society against the broader impact of fires and therefore should ultimately be the starting point and mainstay of a building's fire protection philosophy. It is therefore appropriate that legislation have, through building codes, requirements and incentives for the provision of fire sprinklers in all public, commercial and industrial buildings. IFP

FM Global is a commercial and industrial property insurance company. If you have comments or questions on this article, please contact the author, Brendan MacGrath, Manager, International Codes and Standards Group at email: brendan.macgrath@fmglobal.com or Tel: +33.1.46.93.97.00

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Why is the Documen
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The latest revisions of Approved Document B (Fire safety) of the Building Regulations came into effect last April and have already had a noticeable impact on the designing of fire safety into buildings. However, one important section of the Document – Clause 5.38 of Volume Two (buildings other than dwelling houses) Protected Power Circuits – does not appear to be universally understood, applied or enforced. Chartered surveyor and chartered building consultant, Michael G Proud ARICS MCIOB MBEng, explains.

By Michael G Proud, ARICS MCIOB MBEng

The introduction of the Regulatory Reform (Fire Safety) Order in October 2006 gave a major, and undoubtedly irreversible, boost to the trend to use fire engineering principles and techniques to devise fire safety solutions. This is particularly so for large or complex buildings, or those that establish new architectural or building design boundaries. Frequently in these structures, occupant safety, structural integrity and property protection rely solely on the dependable operation of sophisticated fire detection and alarm systems; smoke venting systems; electrically-operated fire doors and smoke curtains; firefighting lifts; pressurisation and depressurisation fans; motor-driven smoke control dampers; and pumps for sprinkler systems and wet-risers.

To be effective, these life-preserving systems and components must remain operational under fire conditions, the more so if, as is increasingly becoming commonplace, they are integrated into

t B Requirement for cuits Being Ignored?

a single building management system. So, to ensure that they continue to operate in a fire, it is essential that the power circuits continue to function, and this is undoubtedly the reasoning behind revising the protection required for power circuits in Clause 5.38.

So what, precisely, is Clause 5.38 seeking? It states:

"**Where it is critical for electrical circuits to be able to continue to function during a fire, protected circuits are needed. The potential for damage to cables forming protected circuits should be limited by the use of sufficiently robust cables**, careful selection of cable routes and / or the provision of physical protection in areas where cables may be susceptible to damage. Methods of cable support should generally be non-combustible and such that circuit integrity will not be reduced below that afforded by the cable.

A protected circuit for operation of equipment in the event of fire should consist of cable meeting at least the requirements of PH 30 classification when tested in accordance with BS EN 50200:2006, or an equivalent standard. It should follow a route selected to pass only through parts of the building in which the fire risk is negligible and should be separate from any circuit provided for another purpose.

In large or complex buildings there may be fire protection systems that need to operate for an extended period during a fire. Further guidance on the selection of cable for such systems is given in BS 5839-1, BS 5266-1, and BS 7346-6."

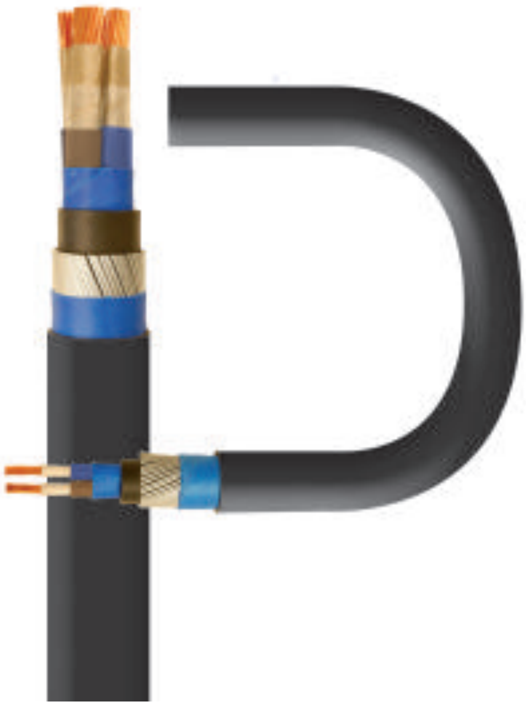
The emboldening is mine, as these particular references highlight the requirements of this part of Approved Document B that are too frequently not being applied. The question is, if Building Control Surveyors are not insisting on compliance, why not? And if contractors are not installing compliant cable in all relevant buildings, why not? Perhaps it is a lack of awareness of the availability of cables that meet the required standard, in particular BS 7346-6 (Components for smoke and heat control systems: specifications for cable systems) with its much more stringent testing requirements than the earlier BS 7846; or perhaps it is a failure to understand the importance of Clause 5.38 or a misinterpretation of what is a "large or complex building".

In terms of options to mineral insulated cables, there appear to be just two on the market that can claim to satisfy the demanding requirements of Clause 5.38.

Available cable options

The reality is that cables do exist that satisfy this stringent standard. Traditionally, fire safety requirements have been met using mineral insulated cables that incorporate insulation of highly-compressed Magnesium Oxide. These are certainly a robust and long lasting solution, but both specifiers and installers have moved away from mineral insulated cables in recent years because of the cables' high cost. They are also difficult and expensive to terminate, and their declining use has meant that the skills required are fast disappearing. With mineral insulated cable manufacture all but disappeared from the UK – I believe there is now just one indigenous producer – the quality of imported cables has become suspect and supply problems are often being cited as an additional reason for their not being used.

In terms of options to mineral insulated cables,



there appear to be just two on the market that can claim to satisfy the demanding requirements of Clause 5.38. However, it is believed that, currently, only one of these options is third-party approved. This is a particularly important consideration bearing in mind that the Regulatory Reform (Fire Safety) Order has, rightly, made the market far more conscious of the need to use only proven, third-party approved, top quality products. The Fire Safety Order demands that "reasonable" steps be taken to ensure fire safety, so it is surely reasonable for installers to expect independent test certification by such organisations as BASEC or LPCB. These organisations are accredited by UKAS – United Kingdom Accreditation Service – to ensure that their credentials are of the highest international standards.

In Firetuf Powerplus, Draka has developed a solution that uniquely meets both the required superior standard and is third-party approved across its entire size range. It is a conventional 600/1000V SWA (Steel Wired Armoured) power cable design with additional fire barriers that provides the necessary enhanced circuit integrity performance to meet the demanding requirements of BS 7346-6:2005 and is LPCB (Loss Prevention Certification Board) approved. Firetuf Powerplus utilises high-performance materials to achieve the maximum 120 minute rating when subjected to integrated testing involving flame irradiation exposure, direct impact and high-pressure water spray under fire conditions.

It certainly does not require special glands or any different skills or techniques from other Draka OHLS – Zero Halogen Low Smoke – cables. Another plus is that, from the installer's viewpoint, the cable is easy to fit, and shows significant installed savings when compared with corresponding mineral insulated cable.

The Fire Safety Order demands that "reasonable" steps be taken to ensure fire safety, so it is surely reasonable for installers to expect independent test certification by such organisations as BASEC or LPCB.

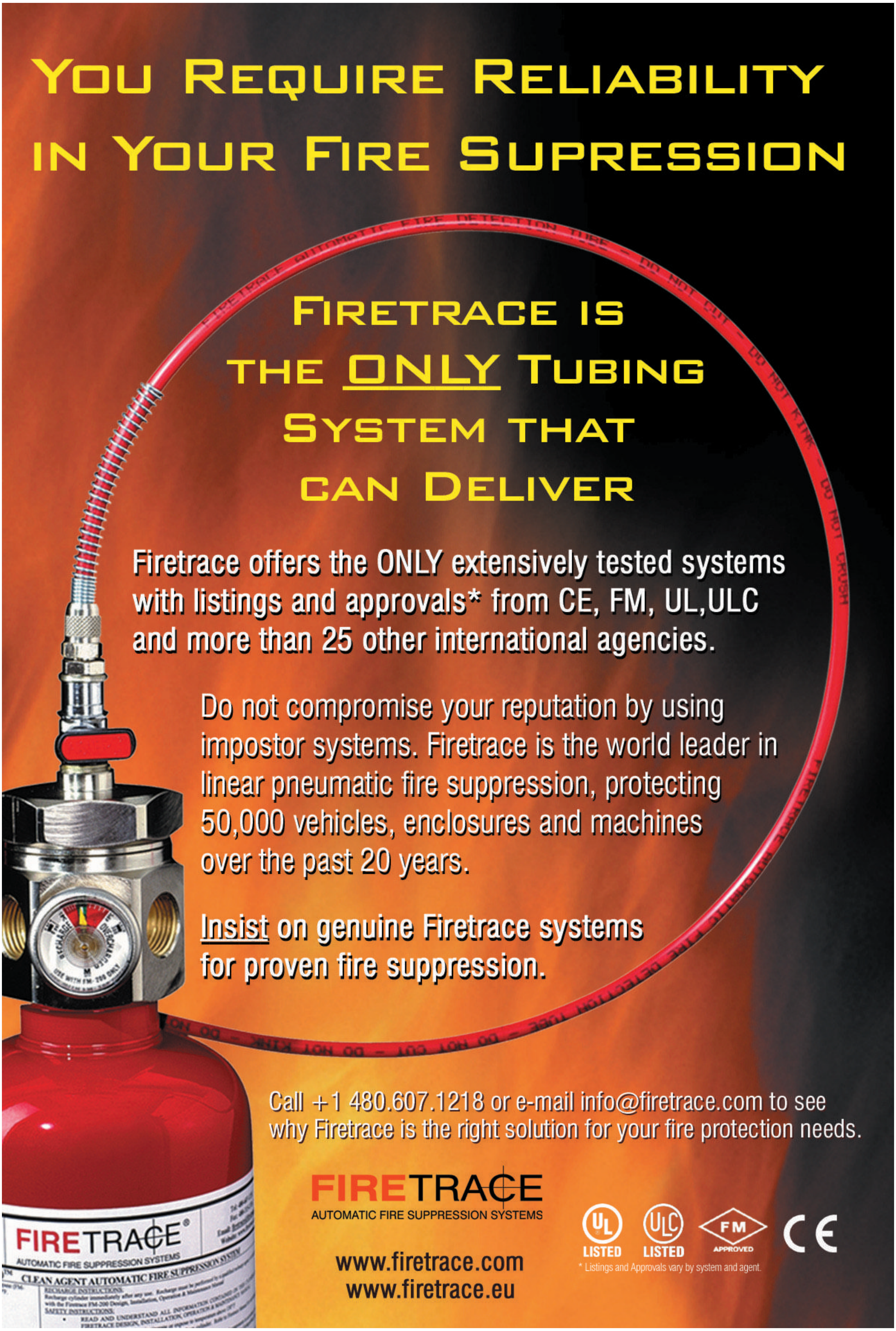
"Large and complex" buildings

So, with the availability of a cable solution to meet the more stringent requirements of Clause 5.38, the possibility that there is insufficient understanding of what constitutes a "large and complex" building must be having a bearing.

Like a number of the terms used in the Fire Safety Order, such as "reasonable", "competent" and "responsible", determining if a building should be considered as "large and complex" is not always easy. So, perhaps the approach that building designers, fire engineers, installers and building control officers ought to adopt is to invert the description, by asking if the building could reasonably be described as "small and straightforward"? If not, then the Clause 5.38's more demanding BS 7346-6:2005 power circuit cable requirements should be applied.

Certainly, the type of structure envisaged by the authors of the revised Approved Document B could reasonably be taken to include all multi-use or multi-function buildings, high-rise structures, buildings with complicated or lengthy evacuation protocols, high-hazard structures, and any building where life safety is dependant upon the reliable operation of active fire precautions or electrically-operated passive measures.

For these buildings, cables that comply only with the less demanding standard of BS 7846 are simply not acceptable; they do not comply with the requirements of Approved Document B, and potentially leave everyone involved additionally liable to prosecution under the Fire Safety Order. Companies may even have to face the prospect of an action under the new Corporate Manslaughter and Corporate Homicide Act if it can be shown that the organisation's management paid scant regard to the proper management of health and safety with fatal results. And that "scant attention" may well be interpreted as failing to ensure that company staff complied fully with Clause 5.38, who in turn failed to install the required performance power cable resulting in the death of occupants or firefighters. IFP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By Ian Steel

Managing Director, Fire Fighting Enterprises Ltd

Many buildings rely on sprinkler systems for protection but in areas with very high ceilings, the usefulness of the heat-triggered sprinkler is limited. In the time it takes for ceiling-level temperature to reach the point where the sprinkler is activated, there could be a serious fire below. Smoke detection equipment can provide an earlier warning of fire, yet many specifiers are deterred by the high cost of protecting a large area with point type detectors. The use of beam detectors provides an ideal solution.

How do beam detectors work?

There are two main classes of beam detector, end-to-end and reflective:

In the end-to-end type an infrared beam is generated by a transmitter, which is directed towards a receiver on the opposite wall, where the signal intensity is monitored. Power is needed for both the transmitter and the receiver.

The reflective type combines the infrared transmitter and the receiver in the same discrete unit. The infrared beam is directed towards a reflective prism on the opposite wall. The integral receiver then measures the intensity of the reflected beam. With this type of beam cabling is only required at one end.

It is very important for installers and users to be aware that beam detectors do not offer a "one size fits all" solution. There are many applications that will only be suitable for an end-to-end type of beam detector. A reflective beam, motorised or static, does not provide a panacea. It is important that potential installers or users, if unsure of which beam type to use in a particular installation, solicit an unbiased opinion from a manufacturer that offers a complete range of beam detector products

Wide Area Protection

Fireray End-to-End Beam

Beam detectors operate by measuring the amount of obscuration of the beam. If the beam is obscured by smoke, then the units will go into 'Alarm'. However if the beam path is blocked suddenly, for example by an operator stacking crates in front of the beam, then the units will go into 'fault' mode. The detectors will normally reset within around 4 seconds of the condition being rectified.

There are a number of operational parameters dependent on individual usage requirements and environmental considerations. Most systems have at least three selectable alarm thresholds; if the received infrared signal reduces to below the selected threshold for a predetermined time then the fire relay is activated. The fire relay can be in auto-reset mode or latching mode, which will hold the fire relay active indefinitely after an alarm condition.

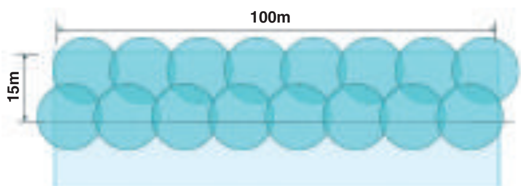
A further refinement is the "drift compensation" facility whereby the beam smoke detectors monitor long-term degradation of the signal beam strength caused by the build up of dirt on the optical surfaces, or gradual building movement. This works by comparing the received infrared signal against a voltage reference every 1.5 hours.

Fireray brand infrared optical beam smoke detectors are very well regarded in the fire industry and are recognised as the beam that offers the optimum combination of affordability and features. They are less prone to stray reflections than beams from other manufacturers, resulting in a more reliable unit and have a smaller footprint, making them less obtrusive. In addition the current draw is one of the lowest for a conventional beam.

Recent developments in beam detector design have seen the introduction of fully programmable, self-aligning, motorised beam detectors. These are based on reflective beam types but offer much wider operating parameters. Users can finely tune the beam to best suit the operating environment.

Cost implications

The use of beam detectors offers numerous cost advantages over alternative detection technologies. The use of point detectors to protect a large area could prove expensive; in addition to the large number of individual detectors, the project would require extensive cabling for power and signalling to every device, as well as a lengthy commissioning process. One solution would be an aspirated system, with air pumped from a series of sampling points to a small number of spot detectors. This method, however, brings with it the need for extra ductwork and fans which can significantly eat into the cost saving made by using fewer detectors, as well as making the building interior less attractive. There are also potential access issues for the installation of the aspirating pipe work.



Point detector coverage over Beam detector maximum area

Beam detectors are cost effective in that one unit can protect an area equivalent to that protected by up to 16 point detectors. A beam detector has the capability to protect an area of up

Fireray Reflective Beam

to 1500m^2, compared to 175m^2 for a single point detector. Note that for multiple point detectors the areas for each detector needs to over lap as demonstrated in fig.4. This alone should equate to a substantial cost saving in terms of detector hardware. Add in the savings from substantially reduced cabling cost and installation time and the overall savings can be significant.

Beam detectors are cost effective in that one unit can protect an area equivalent to that protected by up to 16 point detectors.

The new generation of motorised beam detectors further helps to reduce cost disruption. Not only is the beam self aligning during set-up, reducing the time that engineers need for installation, but it also employs the use of complex algorithms to ensure that the infra-red beam remains targeted on the reflective prism in the event of gradual building movement, removing the requirement for seasonal realignment of the beam. The more advanced variants of motorised beam detectors also use a laser to help to speed up the initial installation process and allow for adjustment of the beam path from the controller at ground level.

Less disruption

The comparative ease of access to wall-mounted beam detectors means an additional advantage when servicing is due. It is much simpler to reach a small number of devices fitted round the perimeter of a space than it is to access a large number fitted in multiple locations across the ceiling. Indeed, the latter would normally necessitate moving equipment or stock, halting regular activities and bringing in specialist lifting gear, All of which can be costly and highly disruptive in a busy factory environment.

In sites of historical and cultural interest, the need to protect life and property must be balanced with a respect for the appearance of the interior. Point detectors can be visually intrusive because of the numbers required, while sprinklers would be inappropriate where building contents are irreplaceable. In contrast, beam detection may provide the optimum combination of safety and aesthetic sensitivity because just one detector set can cover up to 1500 sq m. It will in most cases be preferable to mount a small number of devices high on the walls rather than installing many units at ceiling level. IFP

CFD – Colour For real thing?

There is increasing debate in the field of Fire Engineering as to whether predictions calculated using Computational Fluid Dynamics (CFD) are reliable. Some experts declare that the tools are well advanced and ready for mainstream use while others express a preference for them to be locked away in the research institutions that developed them!

By Peter Massingberd-Mundy

Technology and Expert Practices Manager, Xtralis – manufacturers of VESDA

In fact, what is most important is that they are used and checked by people who understand them. In this article we look, in layman's terms, at how easily CFD tools can be used and abused, particularly in relation to the complexities of predicting the operation of an Aspirating Smoke Detector (ASD). The examples given provide an insight into how CFD is a powerful tool for the professional fire engineer but with the increasing ease of use and accessibility can allow novice users to generate colourful but misleading simulations which appear very impressive. Ultimately, the article concludes that, as with early motorcars, there is still a need for the man-with-a-red-flag.

A tongue-in-cheek comment from one well respected fire consultant illustrates one aspect of the challenge. He said simply, "I like CFD as, in the hands of an expert, it will give me any answer I want!". Whilst alarming, this is not as disturbing as the availability of simple tools which feed assumptions into downloadable CFD packages and enable people with zero experience in Fire Engineering to generate convincing smoke and heat simulations. In the first case, we have a professional using the tool with a full understanding of the factors that can influence the results, while in the second case, huge assumptions can be overlooked unintentionally. A "consciously competent" person is arguably somewhat safer than an "unconsciously incompetent" person – assuming the former is not totally unscrupulous!

Fortunately, as the science is not new there are now guidelines and standards on how a Fire Engineered solution should be conducted and presented. BS7974:2001 – "Application of Fire Safety Engineering Principles to the design of buildings" is an excellent example of how "good practise" can be realised. For example, Section 5 provides recommendations on the content and structure of the final report which, if followed, make it relatively easy for an independent expert to review the validity of any CFD models used to justify a particular design; the pertinent information being presented in a logical and consistent fashion.

As CFD tools develop further, they will inevitably get easier to use and become more robust – not just in terms of the accuracy of the models, size of meshes and computational complexities but also in terms of restricting the inputs, the variables and user interfaces. Eventually it will be possible for CFD tools to be driven safely by relatively inexperienced users – rather like the fact that cars can now be driven by normal people, without any knowledge of what is going on under the bonnet! However, widespread car use is only possible because of the standardised positions for controls and all the automatic adjustments such as electronic ignition, automatic choke, ABS, EPS etc. So, it

The examples given in this article provide an insight into how CFD is a powerful tool for the professional fire engineer but with increasing ease of use and accessibility can allow novice users to generate powerful but misleading simulations.

Directors or the

can be assumed that when CFD models have equivalent solutions/protections for "normal driving" conditions then there *is* scope for them to be driven *unsupervised* by a wider population of users – without being preceded by a man-with-a-red-flag! Of course, in the case of Fire Engineering, the "man-with-the-red-flag" is essentially a respectable independent reviewer of the work/design. Fortunately, there are increasing numbers of experts with CFD experience so the costs for such an independent review are inevitably falling.

density (using CFD) and comparing it with the claimed sensitivity of the particular detector – whether that detector is a conventional or addressable point detector or a single *independent* sampling hole of an aspirating detector. For point detectors this is because they respond very differently according to their design, operation and the particular characteristics of the smoke and airflow surrounding the detector.

Clearly, for an ASD system which uses a centralised detector sampling from many points within a space, each sampling point has a particular flow and transport delay which contributes to the smoke analysis and alarm reporting performed by the centralised detector. Fortunately, this "smoke entry" characteristic is largely independent of the airflows in the locality of the sampling hole and can be predicted reasonably reliably. The same is not true for a normal point detector whose "smoke entry" response can be significantly affected by the localised airflows – whether resulting from the thermal affects of the fire or from inherent airflow present in the protected space. So, it is a gross assumption to simply presume that an alarm will be signalled when the optical density of smoke predicted by the CFD model exceeds the "sensitivity" of the detector – particularly when the "sensitivity" is simply taken as the number quoted by the manufacturer (whether in dB/m or %obscuration/m).

Predicting the smoke entry characteristic of an ASD actually uses a form of CFD – i.e. various pipe flow models. While predicting pipe flows generally is widely researched and understood, predicting the flow of air into a pipe with numerous holes in it is not trivial because each hole changes the flow characteristic at each sampling point. However, Xtralis (and other ASD manufacturers) have developed software packages (see ASPIRE2 figure) which predict the flow of air into each hole and the resultant transport time to the detector. These models have been refined over many years and, while some are more accurate than others, they provide useful information which can be integrated with CFD fire models.

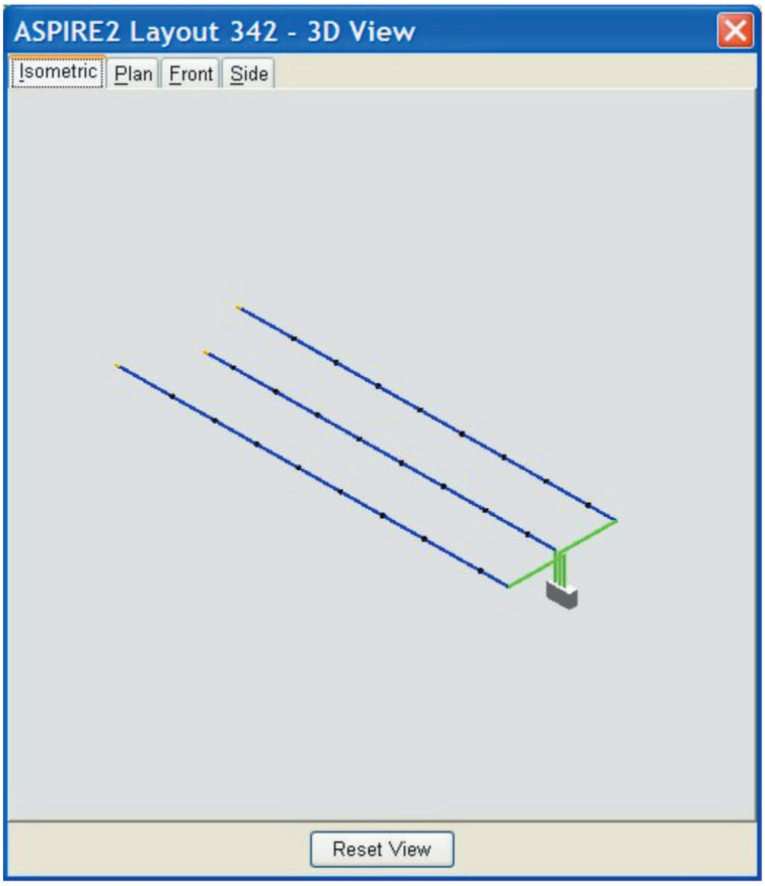
Predicting when an Aspirating Smoke Detector operates – or indeed when any smoke detector operates – is not a simple matter and depends critically on the smoke entry characteristics.

Regardless of who constructs, drives and reviews the CFD model it is imperative that the model is operated within its limits/assumptions and that those limits/assumptions have been properly defined and verified. For example, the Application Engineering Group (AEG) at Xtralis have generated numerous CFD models to predict the response of VESDA detectors:

– In a wide range of enclosure geometries (i.e. high ceilings, large areas, irregular shapes, etc), ceiling types (flat, beam pockets, waffle-type), enclosure types (material type, density), etc.
– In a wide range of environmental conditions such as natural/mechanical ventilation, different ambient temperatures, varying air stratification levels etc.
– For a wide range of fuel types and fire sizes such as varying heat release rates (HRR) for example T^2 and steady state growth profiles, varying soot yield, etc.

These simulations have been supported and developed in association with numerous fire experiments which test and validate the CFD models and as such they are being used successfully to campaign for changes in the prescriptive codes. Most importantly, the research has been reviewed and supported by independent experts within the Fire Engineering community.

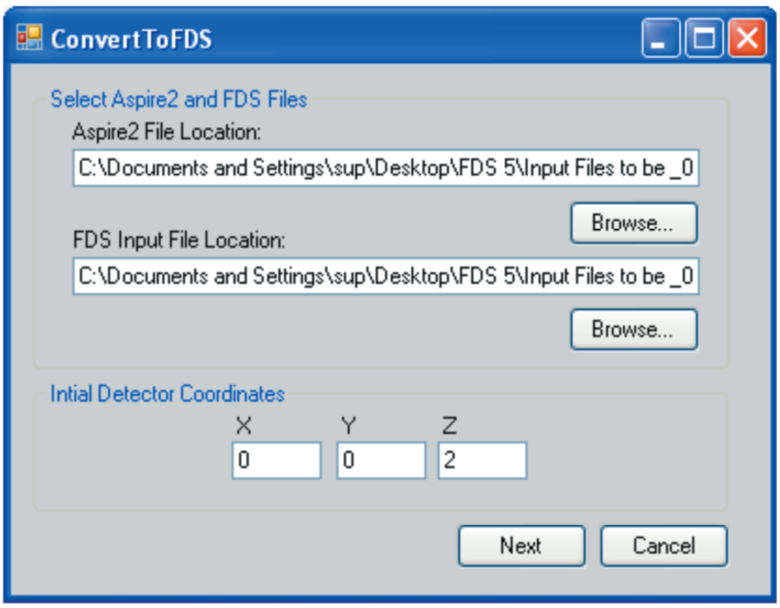
Predicting when an Aspirating Smoke Detector operates – or indeed when any smoke detector operates – is not a simple matter and depends critically on the smoke entry characteristics. It is NOT valid to assume that you can predict the moment of detection by calculating the optical

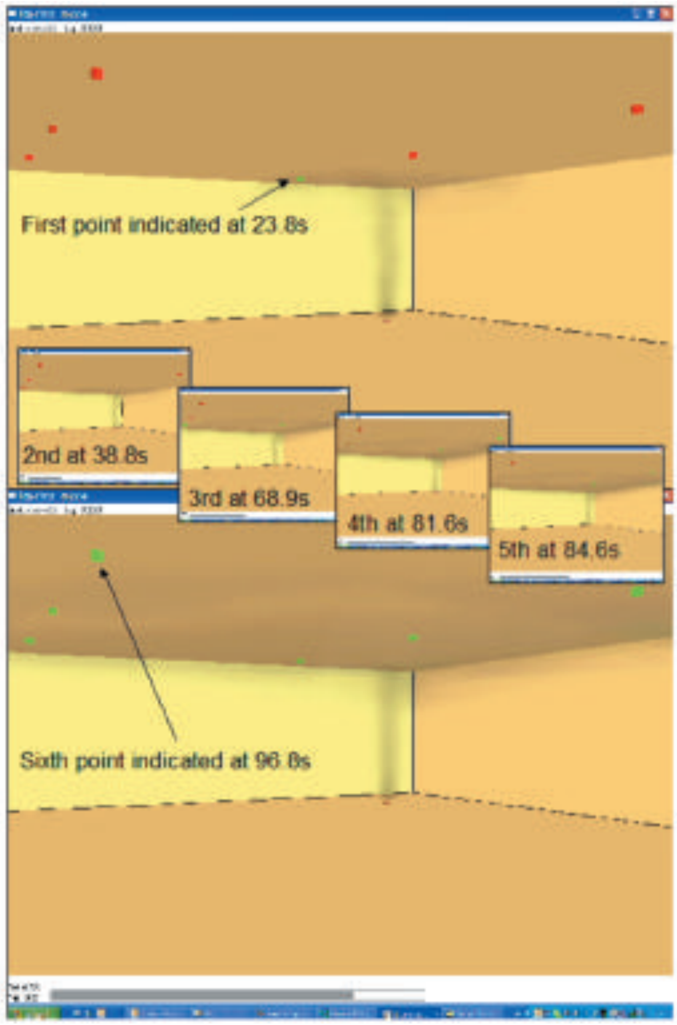


The Application Engineering Group (AEG) at Xtralis have, over the last 5 years, pioneered the use of CFD models to predict the performance of ASD systems and have influenced many projects and several standards groups with their work. As already mentioned, much of this work has been validated against fire tests. Most recently, AEG has been reviewing the *latest* release by the US National Institute of Standards and Testing (NIST) of Fire Dynamic Simulator (release 5.1.0) which now claims to provide routines for calculating the response of a multi-hole ASD system. This is an important step forward and Xtralis have made available a converter to translate the design data of ASD system, contained within an ASPIRE2 pipe design (see figure), into data for input to FDS5.

It is important to appreciate that the validation work and, moreover, the fixed alarm thresholds, on which the reputation of VESDA is founded, is fundamental to the validity of this integration of ASPIRE2 and FDS5. Without fixed alarm thresholds it becomes *extremely* complex to predict the response of an ASD because the sensitivity of an adaptive system depends on the smoke and background conditions during the hours *before* the fire, and consequently before the CFD model starts.

The ASPIRE2 to FDS5 converter is only available to experienced users of FDS who undertake training on ASPIRE2 and the converter. Most importantly the converter makes no assumptions about the building fabric, the background airflows, the temperature conditions, the fire size, position or combustion characteristics, nor does it make any assumptions about the mesh or setting needed to actually run a fire model using FDS5. Such information is the remit and responsibility of the Fire Engineer running the programme. **In stark contrast, a similar pipe-model-to-FDS4 converter is available on the internet which makes assumptions that are sufficient to quickly generate a simple FDS model.** The results from this model can be used to generate 3D visualisations of the smoke spread which, while being very convincing, is based on many unrecorded assumptions and could be lethal if used as a basis for a Performance Based Design for the protection of a building.





The simulation shown in the figure above was generated by a novice after only 3 hours minimal effort using free software downloaded from the internet. Behind the convincing graphics, the solution indicates is that the ASD detector protecting the warehouse will signal an alarm after 23.8 seconds.

However, huge assumptions (and some errors) are made to get this result and the novice user was completely unaware of them. For example:

- while the fire size was specified as 100kW/m^2 over 1m^2 (i.e. a 100kW fire) the results shows it over 0.1x0.1m (i.e. only 1kW)
- the fire type – a constant heat release polystyrene fire – was a hidden key assumption.
- while the building dimensions were specified the fact that the surfaces were assumed to be brick was unknown.
- initial temperature conditions were unspecified, no openings were modelled, no airflows were considered (from air handling units etc),
- No objects, additional fire load or fire spread was included in the model. Just an open space with an idealised constant 100kW polystyrene fire with constant soot yield.

Regardless of these model limitations in addition to these assumptions in the fire model, the results generated as presented take no account of the transport time or the cumulative effect which are fundamental to ASD technology. While it is relatively simple to add the transport time to the reported response time of each hole (as recommended), calculating the cumulative effect is more challenging. Fortunately, the most recent release of FDS now includes routines to do this – however, to date they have not been independently tested and verified. What is remarkable about the results from the downloaded software model is that the alarm times predicted are based on the theoretical sensitivity of individual sampling holes on a detector that continually adjusts its sensitivity to the background.

This serves as a good example of how powerful tools in the hands of the unskilled, "unconscious incompetent" is highly undesirable.

Currently, the majority of us in the Fire Industry are still learners in the use of CFD for Fire Engineering so having a driving instructor (or respectable peer) to review any Fire Engineered solution remains imperative. Exactly who is qualified to take the role of the man-with-a-red-flag is not absolutely certain but whoever they are and whatever their qualification, there is no doubt that they have an important role to play to ensure that the unquestionable power of CFD is not abused – intentionally or otherwise. IFP

What is remarkable about the results from the downloaded software model is that the alarm times predicted are based on the theoretical sensitivity of individual sampling holes on a detector that continually adjusts its sensitivity to the background.

Victaulic gets to protection

By Fred Matyiku

UK and Ireland country manager, Victaulic

As an H&V contractor, managing the installation of fire protection has always been a challenge. Often one of the last on the job site, the fire team is expected to turn around installation at break neck speed and have the system pressurised, tested and functional within ever increasingly tight time frames. Fred Matyiku, UK and Ireland country manager for Victaulic – world leaders in pipe joining system manufacture – explains how speed can be built into the planning and installation, whilst saving money.

Fast and furious

With fast and furious being the best description of installation time scales on today's commercial jobs, ensuring that the fire protection system is installed in time whilst meeting or exceeding design standards is increasingly a challenge. Victaulic, which specialises in the provision of grooved-end joining systems, has seen a dramatic increase in the use of its non-weld systems in the fire protection sector globally over the last few years due to the demand to save even more time on-site.

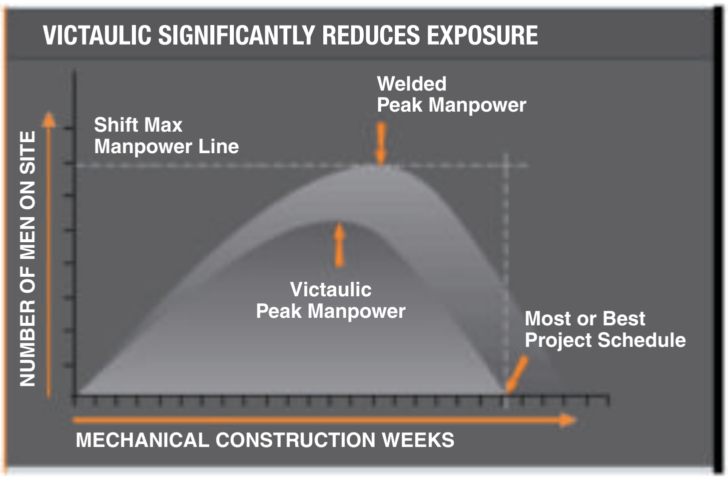
Speed of installation was key on the largest fire protection installation to date in Dubai – in the hangars of the Emirates $353m facility. The new centre sits on 55 hectares just north of Dubai International Airport and its eight hangars together form the largest free-spanned structure in the Middle East. The roofs are supported by 110-metre-long single spans and the construction has meant that the facility now ranks as one of the world's largest civil aviation engineering centres.

During construction, the main contractors, Emirates Trading Agency (ETA), which designed and installed the entire fire protection main loop and deluge system for the hangars, was faced with a range of challenges because of the size of the installation. Due to the expanse to be protected, 12in. fire protection pipes traditionally used throughout the main loop were replaced with pipes up to 32in. in size. Throughout the system, Victaulic Zero-Flex® couplings were used alongside Victaulic elbows and tee's and over 150 Victaulic Firelock 4in. and 8in. deluge valves. The valves

the heart of fire

were installed to enable maximum coverage throughout the hangars,and the larger pipe diameter and increased proximity of deluge valves ensured that the volume of water required for such an expanse could be dispersed through the system within seconds if required.

The use of Victaulic grooved joining methods did speed up installation of the job dramatically, and due to the company's sophisticated forecasting and planning procedures, the deluge valves were on-site only four days after the order was placed.



Money saving by design

Not only is pre-planning vital to shaving time off of the installation schedule (as seen at Dubai International Airport), but also looking at products that have speed built into them is essential. No-flame piping solutions have the advantage over welded systems when it comes to efficiency, as all areas of the site can be kept operational throughout the working day. In addition, a grooved end system such as the Victaulic one does not need a highly skilled labourer to install it and has been shown to be as much as three times faster to install than welded piping.

had to install six sprinkler pumps with a capacity for 30,000 litres per minute to ensure all areas of the warehouse could be covered in the event of a fire. The finished system needed to have the capacity to pump a staggering 2.7 million m^3 of water in a matter of seconds.

The installation of a fire protection system in such a structure was not just about the size of the job. The dynamics of fire in such a structure also impacted greatly on the design of the system. In view of the warehouse height, a fire would spread very quickly through its interior, due to the pulling of flames and gases up into the heights of the structure. In accordance with VdS regulations, the

With the fast moving pace of installation schedules today, it is no surprise that H&V contractors are looking at building speed into their fire protection projects.

According to job study estimates, projects requiring welding can demand up to 45 percent more man-hours on average over no-flame piping solutions.

This combination of speed and ease of installation also has proved invaluable on the largest fire protection installation seen to date in mainland Europe. When working on Tchibo's state-of-the-art, Europe-wide logistics facility earlier in the year, the 47,500m^2 multi-functional warehouse, BLG Logistics placed a priority on speed of installation and delivering the job on budget. With more than 9,000 pallets going through the warehouse a day and a surface area the equivalent of 22 football pitches, the Bremen high-bay warehouse has been designed with ultimate functionality in mind.

The figures for the job are staggering. More than 105,000 sprinkler heads were installed, with 7,000 of them delivered a week for installation. The 20 strong Minimax team working onsite also

sprinkler system was designed to run across different levels of the interior so that in the event of a fire, the trouble spot could be identified, reported and extinguished rapidly.

The sprinklers were fitted onto the pipe off-site and then delivered at specified times for installation. Due to the challenges of installing pipe up to 40 metres off the floor, the majority of the 160km of pipe was not welded into place but rather connected using Victaulic grooved end couplings. The increased safety offered by non-weld installation, combined with the reliability of the coupling at high pressures, made it the ideal choice for Minimax.

With the fast moving pace of installation schedules today, it is no surprise that H&V contractors are looking at building speed into their fire protection projects. As Minimax and ETA have shown, looking at alternatives to welding that provide not only increased installation speeds, but cost-savings as well is the way forward. IFP

For more information on the Victaulic product range or stockists, contact the Victaulic office in the UK on 01438 310 690 or visit www.victaulic.com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C-TEC Launch EP203

– to meet rising demand for Fully EN12094 Part One Compliant Automatic Extinguisher Systems

By Andrew Foster

MD, C-TEC

With the growing emphasis on safeguarding property as well as people and society's increasing reliance on computerised systems, the market for automatic fire suppression systems is booming. On the back of this demand C-TEC has launched its first-ever fully EN12094 part 1 compliant automatic extinguisher panel – the EP203.

Here, Andrew Foster, C-TEC's MD, explains why he believes the panel is destined to become an installers' favourite.

Although safeguarding people is an obvious mandate for any fire alarm system, protecting property and the systems that allow businesses to function correctly comes a close second.

Few medium to large sized businesses can now operate without an IT department and it is therefore essential the technology they are using receives sufficient protection from fire. A small unattended blaze in a server room can destroy not only thousands of pounds worth of equipment, it can cause hours of down-time from which it can be extremely difficult to recover. In areas such as chemical plants, the consequences of a fire can be even worse, so it's no wonder the provision of extinguishant systems is on the increase.

Extinguishant systems work by controlling the release of fire-suppressing gas into areas where fires need to be put out quickly with minimal damage to the equipment being protected.

Despite the increased demand for them, the perceived specialist nature of their installation has led to many fire alarm companies shying away from them. C-TEC believes the introduction of its EP203 panel will go a long way towards changing this.

A typical automatic extinguisher system comprises the fire suppressing agent – usually an inert gas such as Argonite® – storage containers, release valves, fire detectors, the control panel, delivery piping and dispersion nozzles. Fitting such a system obviously requires a degree of expertise

but what appears to frighten most installers off is the fear of programming the system incorrectly and inadvertently releasing the gas. Although the noise from a sounder can be switched off at the touch of a button, replacing gas that has been accidentally released from a network of canisters can cost a small fortune.

This is where the EP203 comes in. It is the first EN12094 part 1 compliant panel to feature an intuitive 128 x 64 pixel two-colour backlit graphic display that gives clear and concise feedback to the user, installer and commissioning engineer. This allows you to commission with confidence as the graphic interface lets you program the system without having to refer to complicated LED arrays, convoluted seven-segment displays and a look-up sheet to help decipher what it is you're selecting. Everything is in plain English.

Despite this simplicity, the EP203 is one of the most powerful extinguisher panels on the market with a comprehensive range of features and ancillaries that make it suitable for use in computer rooms, telecommunication centres, archive storage areas, chemical plants, generator rooms, museums and more.

It includes three conventional detector circuits and three conventional sounder circuits (two x 1st stage, one x 2nd stage), all of which are line monitored for open and short circuit faults. Any combination of activated detector zones – including triple knock or double knock! – can be programmed to automatically activate the panel's extinguishant release sequence, which can be set to operate with or without a delay.

No less than six monitored inputs are provided, including Hold and Abort for suspending or cancelling the release sequence at any time and an optional relay expansion board can provide monitored reset, mode, discharged, hold and abort outputs.

The panel is supplied in an elegantly-styled, durable enclosure with all of its electronics – apart from its powerful 3A EN54 switch mode PSU – mounted on a detachable metal bridge plate for ease of installation. In addition to its backlit display, the enclosure's front also features a manual extinguisher release mechanism (featuring two buttons to reduce the likelihood of false triggering) and a keyswitch allowing authorised users to toggle between automatic and manual mode.

For additional flexibility, up to eight flush or surface remote status units, each with their own graphic displays, manual release mechanisms and mode switches, can be connected to the panel via a monitored RS485 bus. Single gang economy status units without a graphic display can also be purchased.

Other features include adjustable flood times, an alarm counter that records the number of occasions the panel has been in alarm, a time-stamped log, support for up to two solenoids or multiple Metrons and volt-free changeover relay contacts for fire, local fire, 1st stage active, 2nd stage active, extract fan and fault.

The EP203 also includes ALL of the options with requirements of EN12094 part 1 (Fixed fire fighting systems – Components for gas extinguishing systems – Requirements and test methods for electrical automatic control and delay devices) including:

4.17: 'Delay of extinguishing signal' – delay time from 0 to 60 seconds.

4.18: 'Signal representing the flow of extinguishing agent' to indicate the flow of the extinguishing agent.

4.19: 'Monitoring of the status of components' by way of a low pressure switch input.

4.20: 'Emergency hold device' to enable the extinguishant delay time to be extended.

4.21: 'Control of flooding time' to deactivate the releasing output after a set time period.

4.23: 'Manual only mode' to disable the release of extinguishant via automatic detection devices.

4.26: 'Triggering of equipment outside the system' by way of first and second stage contacts, etc.

4.27: 'Emergency abort device' to inhibit the extinguishing signal until the emergency abort device has been deactivated.

4.30: 'Activation of alarm devices with different signals' to indicate pre-discharge and released warnings using different sounds.

C-TEC firmly believes no other panel can offer all of the above and the EP203's extensive range of commissioning and engineering functions. It believes these features, coupled with the panel's competitive pricing structure and ease of programming, make it the perfect choice for experienced and novice installers alike.

If you would like to see a demonstration of the new EP203 panel in action, contact C-TEC's marketing department on +44 (0) 1942 403810. IFP

C-TEC is one of the UK's largest independent manufacturers of life safety electronic equipment with a portfolio of products that also includes fire alarm control panels, voice alarm systems, induction loop amplifiers, call systems and disabled refuge systems. For further information contact C-TEC 's marketing department on +44 (0) 1942 403810 or visit www.c-tec.co.uk

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Fire-resistant Glazing

The importance of insulation protection against the effects of fire

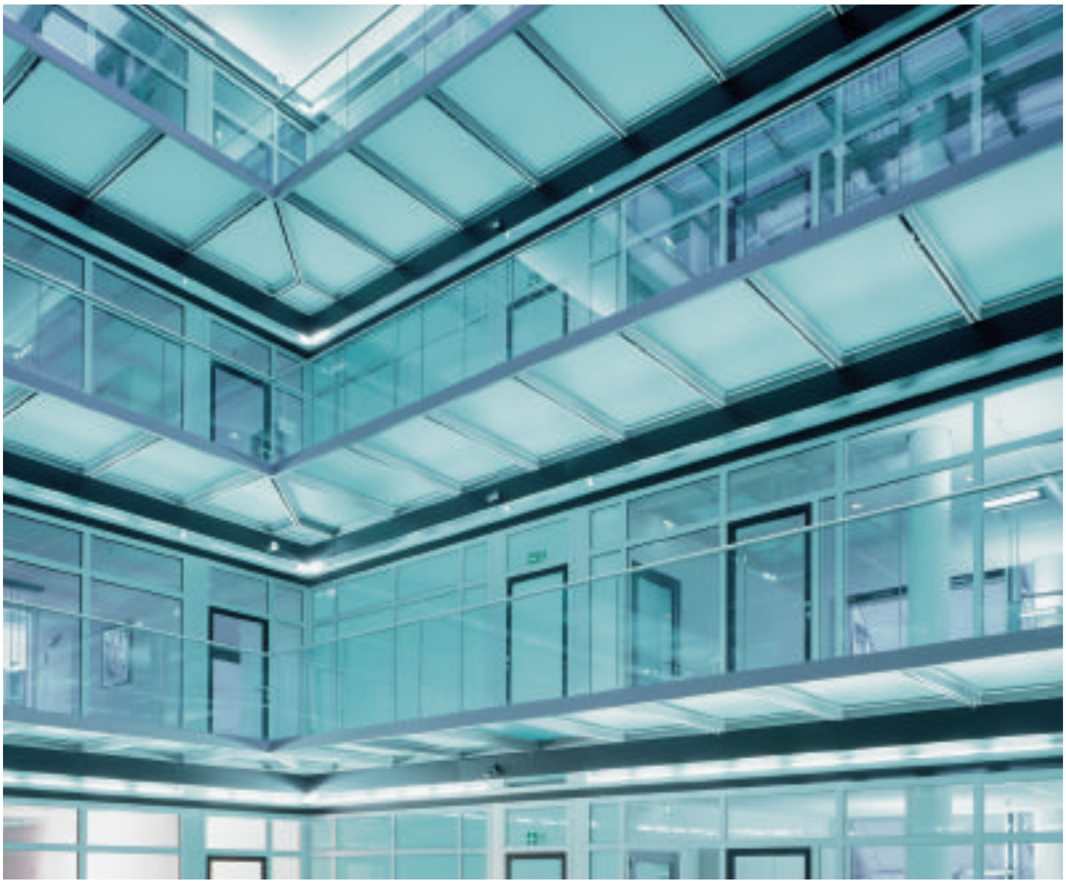
Transparency has obvious disadvantages in a fire. Although a transparent barrier may hold back flames, it hardly provides significant practical protection against the heat of a fire.

By Mike Wood

Pilkington

High levels of transmitted and radiated heat are possible in developed fire conditions which can threaten both people and property. A functional risk-based approach to fire safety design therefore has to look at the detail of how glass functions in fire in order to make a considered judgment on the consequences of using integrity only glazing and the associated design limits. The unpredictability of fire and the fundamental uncertainty of knowing what may happen should fire break out may lead to insulation performance being chosen as the decidedly safer and more effective design choice, especially for critical locations. Fire resistance should not be considered generically, and certainly not without evaluating the particular implications of either integrity or insulation performance, as these two levels of performance have totally different levels of risk and assurance against the uncertain hazards of fire.

Integrity means a physical barrier against fire, nothing more. This requires that smoke, flames and hot gases are held back. Basic integrity performance carries no assurance concerning attenuation of the heat of a fire. Integrity may be acceptable governed by the implicit assumption that escape takes place before conditions become untenable. That is before the fire grows towards flashover, assuming prompt detection, response and escape. Circumstances may dictate otherwise, however. Entirely different escape conditions may apply if the fire is more developed. Insulation performance may then be critically important for life safety – both for occupants and fire fighters –



and especially for property protection since the heat exposure in developed fire conditions may become both prolonged and intense.

Most integrity glass types which remain clear in a fire can give rise to potentially high levels of radiant heat on the protected side of the glazing. Such levels of heat may be a significant threat to people and can be capable of causing combustion of paper and synthetic materials such as those used in fixtures, fittings and furnishings. There are four particular hazards to consider:

- direct exposure to potentially high levels of transmitted and radiated heat with the risk of burns to exposed skin;
- convective heating of the atmosphere in the escape way progressively raising the risk of heat stress;
- smouldering smoke generation (before ignition) from floor coverings, fixtures and fittings in the corridor;
- secondary ignition and flaming of fixtures and fittings in the escape way as conditions approach flashover, or if flames penetrate through or round the integrity barrier.

Such risks have to be taken into account even if the integrity fire resistance of an integrity glazed element is maintained. If, for example, basic integrity glazing extends to within only 100mm of floor level (as recommended for some cases in regulation Approved Document B, 2007, for England and Wales) then transmitted radiant heat through integrity-only glazing can produce smouldering smoke generation from floor coverings. Higher heat intensities on the non-fire side of the glazing can lead, for example, to melting of nylon net curtains, ignition of paper close to the glazing, and even melting of ceiling light covers with bursting of fluorescent lighting tubes. Only those integrity glass types which produce a measure of insulation, for example for 15 minutes within the normal standard test time of 30 minutes, are capable of limiting this possibility (e.g. those based on a glass laminate using a special insulating intumescent interlayer, such as Pilkington Pyrodur). Other clear and non-intumescent integrity glass types do not carry the same level of assurance.

Fire-resistant glass types with a full rated insulation performance for 30 minutes or longer are expressly designed to limit the heat transmission from fire by all mechanisms whilst retaining integrity. The test criteria for insulation performance classification require surface temperatures on the protected side of a barrier to be no higher than 140°C on average, with no individual point greater than 180°C. This delivers low heat levels on the protected side of the glazing, typically at a heat intensity of 1kW/m^2, or less, which is no more than the maximum exposure from the sun at ground level in midsummer. Not many fire-resistant glass types can meet these insulation criteria. Even a measure of full insulation performance, e.g. for only 15 minutes, represents a much better and safer option than simply integrity only.

Care also needs to be exercised in considering the new supplementary EW category provided by the European classification scheme for fire resistance. The temptation to see this category as a half way house between basic integrity and insulation should be avoided. The maximum radiation limit set by the EW category is 15kW/m^2 measured at 1 metre distance. This is a high level of heat exposure which, for example, provides only 2 seconds of exposure before the pain threshold is exceeded (DIN 33403-3:1988). The piloted and

non-piloted ignition of light synthetic materials also lies within this range. The classification limit also allows a wide span of measured radiant heat values to be included in the same class, for example from 3kW/m^2 to 15kW/m^2. This is a broad range with big differences in the effects produced by radiant heat from top to bottom of the range. Also, the radiant heat as measured is sensitive to the glass radiating area and aspect ratio (which are sadly rarely stated). The EW classification cannot therefore be taken as a glass characteristic but only as a feature of the particular tested assembly. In effect, all integrity glass types (including wired glass) can be assigned an EW class depending on the radiating glass area. The EW class is therefore rather a diffuse one that blurs the boundaries between integrity and insulation; and a class that is not, as such, very useful to the functional fire safety design engineer in terms of cleanly evaluating fire risk.

A fully considered risk-based approach to fire safety design also needs to have access to a level of information that is not customarily provided by a test report or product certificate. Where judgments have to be made and risks balanced then considerations of the consistency and reliability of fire performance, whether integrity or insulation, are especially pertinent. Such information cannot be obtained from a single furnace standard test. The record of several standard tests in several systems needs to be taken into account. Experience from real fires and large scale non-standard test assemblies that are representative of likely structures are also helpful. This requires a more open dialogue with the manufacturer than is customarily the case. The mechanism of failure, in particular, needs to be taken into account (especially in functional risk-based design) as this is a key indicator of likely performance in real fire conditions. The mode of failure is critical. And each type of fire-resistant glass has its own particular mode of failure. For example, a fire-resistant glass based on standard glass laminated with a special intumescent interlayer (such as Pilkington Pyrodur and Pilkington Pyrostop) shows a slow and progressive mode of failure as each interlayer reacts in turn. The function of the intumescent interlayer is reliable and repeatable; as a result the mode of failure is essentially controllable and predictable. There is a big difference between this mode of failure and one that is characterised by sudden catastrophic failure without warning – essentially being unpredictable and therefore more subject to chance. Such a catastrophic failure mode, for example, is typical of modified toughened soda-lime-silica fire-resistant glass, with a probability of failure that can only be minimised if the glass is produced, handled and used under stringently controlled conditions.

Above all, it is critical to know that fire-resistant glass should only be installed as part of an approved fire-resistant glazed system of matched components (which includes the frame, beads, seals and fixings). What is achieved in terms of fire performance with one fire-resistant glass may not be achievable with another: tested approvals are individual approvals and apply to particular configurations, glazing pane sizes, aspect ratios, glazed area and applications. Supporting test evidence is essential. The test evidence must be relevant to the application and applicable in key respects

to the installation (e.g. pane sizes and glazing layout). There must be no temptation to install a system without applicable test evidence; any assessments used to back-up an application should be based on relevant, current and appropriate test evidence; and mixing and matching between different systems is to be avoided because the effect on performance maybe unexpected and disastrous as a result.

Time in a fire is critical. Endurance is especially crucial for the building and its contents: fire exposure may amount to several hours of intense burning. For escape, a matter of minutes or tens of minutes may be sufficient, if circumstances remain favourable. Fire development may, however, be a lot faster in reality than assumed in design; active systems may not function as intended because of system malfunction or human interference; fire intensities may be far higher than anticipated; and the fire and rescue service may not, determined by circumstance, be able to attend in sufficient time to control the fire during its early stages. Events may not turn out as ideally scripted. An assumption that what serves life safety also adequately meets the needs of property protection may be disastrously flawed. Such considerations may therefore determine at the design stage that integrity be upgraded to insulation performance, and that the classification period for insulation performance be increased from 30 minutes up to 60, 90, 120 minutes or even longer, especially if property protection is important.

Where glass requires fire resistance then insulation provides the most reliable and robust level of fire protection because of the high degree of protection that insulation affords as a barrier not only against flames, fumes and smoke but also against heat transfer which may rise to high levels in modern fires. Faced with the unpredictability of fire events and the complexity of modern buildings, the choice between insulation performance and integrity may not be a straightforward one. In the final analysis, much may depend on how faithfully the actual course of events mirrors the initial design assumptions. IFP

Mike Wood has more than thirty three years experience at Pilkington as a specialist who has concentrated on the behaviour of glass in fire and on the development and characterisation of fire-resistant glazing. He is the chair of the UK's Glass and Glazing Federation's fire-resistant glazing group, chair of the Fire Safety Development Group, vice-chair of the Passive Fire Protection Federation and a participant in several British Standards Institute committees on fire-related matters.

Designing For I Challenges In F

Fire protection products are increasingly being developed specifically for 'industrial' applications, recognising that there are particular requirements for such situations which cannot be met by standard products. However, in recognising that there is undoubtedly a burgeoning market, it is important to try and identify what is actually meant by the term 'industrial'.

By Bob Choppen

Product Manager, Fulleon

In fact it has become a pretty vague term that is applied to anything that, perhaps, favours function over form and hence phrases like "industrial strength" or "industrial style" come into fashion, implying something that is effective, but has little concern for aesthetics or finesse. Looking to the dictionary for a more precise explanation we see definitions such as: "relating to the activities involved with producing goods for sale particularly those items made in a factory"; and for a factory: "a building or set of buildings where large amounts of goods are made using machines". So, although it is difficult to be exact in composing a precise definition for what constitutes 'industrial', it is safe to say that in fire protection terms, it is primarily related to manufacturing sites where the environment is hostile.

Wide spectrum

The specifics of the hostile environment can take many forms, often a combination of numerous factors. These can include high levels of humidity, including areas of wash-down, dust (which could be both corrosive and conductive) and extremes of temperature. The risk of mechanical impact is also high so housings need to be robust and ingress protected. A critical consideration in terms of fire protection is the prospect of higher background noise levels from machinery and the probability of people using ear defenders – in such cases sound outputs may need to be much louder than in say commercial or residential areas.

Industrial settings are characterised by a wide spectrum of environmental conditions and there are great variations and extremes to be found. For example, the almost fire and brimstone conditions of a foundry compared to relative tranquillity in an electronics assembly area. Conversely commercial and residential premises can also have difficult conditions and locations such as kitchens and saunas pose environmental requirements which often can only be satisfied by industrial style products. Again back to the difficulty of quantifying the industrial application since a sauna would certainly not be included in a conventional understanding of the term.

Life safety and more

Like any other situation the industrial environment is one where people need to be protected from fire or other hazardous situations brought about by a process failure or a machine fault, but there are also a myriad of other conditions where somebody's attention must be drawn to a problem. These problems are not dangerous but could seriously impact on productivity or result in damage to equipment or the local environment. The same types of audible and visual signals are generally pressed into use and it is important that lower priority alarms are clearly distinguished from life safety issues and the correct response elicited from the personnel close by. A wide range of

ndustry: The ire Protection

alarm devices is therefore required to provide the flexibility in application, from general area and fire alarm, to local alerts and control panel warnings.

Ambient noise levels

Designing sounder systems in buildings requires that the sounders achieve levels at least 5dB above the background noise levels. As already alluded to, in many industrial applications, where ambient noise levels are significantly higher, this requires a rethink as it is not simply a case of applying this approach. It is important to recognise the potential variations in noise levels, not only between distinctly separate buildings and their different operations but also within a single building which itself may house a wide range of activities and their resulting noise levels. Large production areas are particularly susceptible to noise level variations at different points in the process. Designing a system for commercial premises the noise levels are well controlled – typically no more than 70 to 75dB(A) – so that the designer can work with sounders with outputs of around 100dB(A) without any concerns that a sounder may be too loud. The smaller spaces typified by commercial premises usually keep the 'listener-to-sounder' distance to within a few metres so that a lot of sounders are used and the sound distribution is reasonably constant across the occupiable space.

The higher ambient levels and larger spaces that can be found in manufacturing plants make this planning more difficult. High sound levels require high output sounders to give audibility to the signal. However, the signal decreases by 6dB each time the distance from a sounder is doubled, so a

sounder that measures at 120dB(A) at 1m will measure only 114dB(A) at 2m, and 108dB(A) at 4m and so on. In an area where the noise level is running at, say, 90dB(A) an alarm signal must reach at least 95dB(A) to be audible. This could be achieved with a 120dB(A) sounder mounted up to 18m away. Although this may prove effective, it also means that someone close to the sounder could be subjected to almost the full output and at least suffer some discomfort if ear defenders were not being used. Placement of loud sounders needs more attention during the planning stage than using quieter ones to ensure extreme levels are not produced on escape routes. The table below indicates the sort of range that sounders with different outputs could achieve with different ambient noise levels. For example if the background noise level is around 90db(A) in an area, then a 110dB(A) sounder could be mounted no further away from a listener than 5.5m before the

	Sounder Output @ 1m				
Ambient	125db(A)	120dB(A)	110dB(A)	105dB(A)	100dB(A)
115dB(A)	1.8				
110dB(A)	3.2	1.8			
105dB(A)	5.5	3.2	1.0		
100dB(A)	10.0	5.5	1.8	1.0	
95dB(A)	17.0	10.0	3.2	1.8	1.0
90dB(A)	32.0	17.0	5.5	3.2	1.8
85dB(A)	57.0	32.0	10.0	5.5	3.2
80dB(A)	100.0	57.0	17.0	10.0	5.5
75dB(A)		100.0	32.0	17.0	10.0
70dB(A)			57.0	32.0	17.0
65dB(A)			100.0	57.0	32.0

output falls to less than 5dB above the ambient level and audibility is compromised. If voice messages are involved, then 10 to 15dB above the ambient is recommended for intelligibility and the distance from the sounder reduced further.

The table above is not precise as the masking effect of background noise will vary according to the frequency spectrum of the noise and how this conflicts with the frequency of sound produced by the alarm. It is also important to appreciate that sounders do not radiate sound equally in all directions, so output to the side of a sounder will be several dBs down on the level measured directly in front.

The visual approach

Similar arguments hold true for beacons: very bright beacons will warn people of a situation but can also cause glare and temporarily affect vision. This may impair the ability to escape – the exact opposite of the desired effect. Like sounders, the light output from beacons can be highly directional and the mounting position and location is critical – unlike sound, light does not flow around objects and direct line of sight is important.

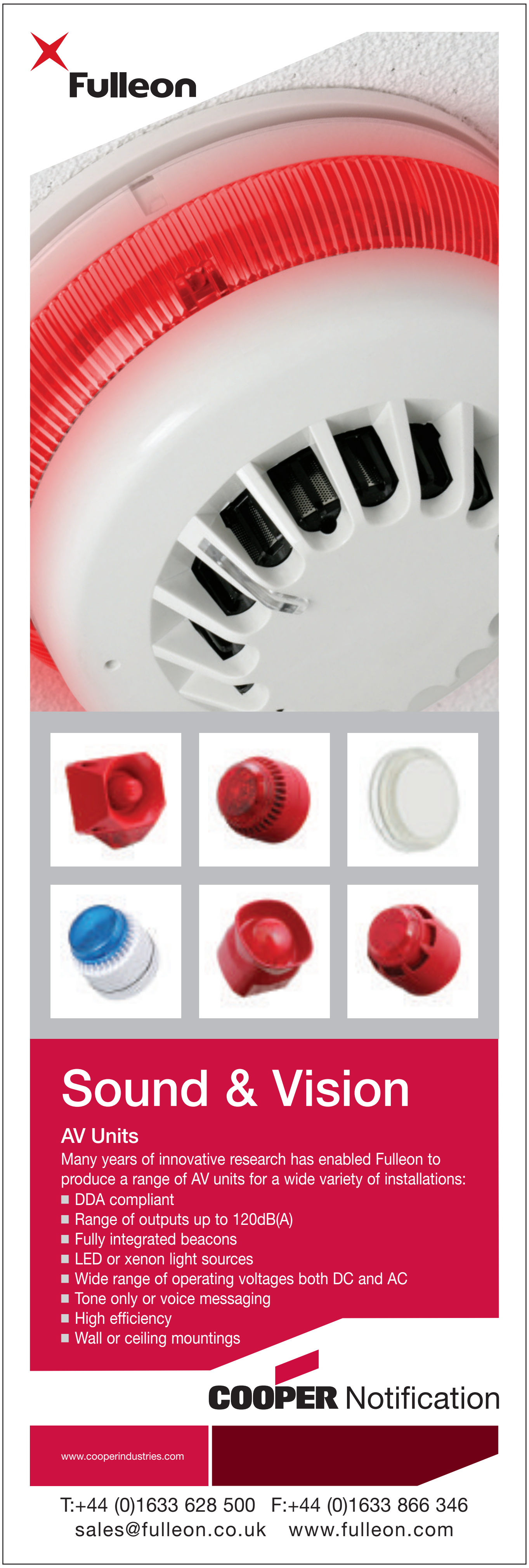
Beacons also bring the added risk to photosensitive people and peppering a site with unsynchronised flashing signals can trigger attacks in those susceptible. It is, however, difficult to avoid the use of visual signals in any location due to the requirements of the Disabilities Discrimination Act (DDA) and the use of ear defenders in many locations.

Matching Product to Risk

Fulleon has a range of sounders and beacons that can meet most requirements: at the lighter end of the scale, sounder products such as the Askari and Roshni, along with the Solex xenon beacons, have long been used in process industries for general purpose alarms and status indications, but are not suited to heavier industrial applications. The Asserta range of sounders, introduced in 2003, marked a move to truly capable industrial products. The range was a new design from the ground up, based on the well developed audible and visible technologies and innovations used elsewhere by Fulleon.

The first products were the Asserta sounder and sounder-beacon, with outputs of 120dB(A) or 110dB(A). The Asserta provides high levels of ingress protection, IP66, rugged housings, a wide range of alarm tones and simplified installation. An innovation was the fully integrated beacon on all versions of the sounder. A further option was the inclusion of a voice message for situations where greater levels of information are required.

The Asserta range continues to grow, now bolstered by the Asserta Midi, Mini and Maxi. The 110dB(A) Midi and 105dB(A) Mini were introduced to fulfil the need for lower output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sounders, while still providing very high levels of protection from harsher environments – again all are available with an integrated beacon. A further feature on the Midi and Mini is an optional Tamper Switch for vulnerable locations and use in security systems. The Maxi fits at the top of the range with a 125dB(A) output, too loud to comply with fire standards, but necessary for some industrial situations where high peak noise levels are experienced.

Light and sound

The Asserta sounder range is complemented by a set of stand-alone "WB" Warning Beacons with the choice of three different light sources to suit most needs and all rated to IP65.

The WB Rotating mirror beacons are highly visible using a halogen lamp as the light source with a mirror revolving around the lamp to provide a concentrated beam rotating at 180rpm (3 flashes per second). The robust counterbalanced drive mechanism allows the beacon to be used in any orientation.

Xenon flash tube beacons are provided in the 15j Double Flash beacon; the double flash giving improved visibility compared to a single flash, but requiring more current. In a more compact enclosure is the lower power but very effective 5j single flash xenon.

The Maxi can be used as either a compact warning beacon or as a status indicator when configured in a traffic-light formation.

The increasing popularity of LED beacons is largely due to their long life – typically 80K hours – and high efficiency. Their longevity makes them ideal for inaccessible spaces and the low power consumption eases the load on power supplies, as well reducing heat dissipation. Although not yet to the output levels of similar xenon based units, LEDs can be highly visible due to the longer flash duration that is possible compared to a xenon unit. The WB Multifunction Beacon permits the remote selection of rotating, flashing or steady operation, useful for indicating different status conditions. Another LED product is the Solista Maxi, a very compact beacon with options for single flash, double flash and steady operation as well as a choice of user selectable operating powers. The Maxi can be used as either a compact warning beacon or as a status indicator when configured in a traffic-light formation.

One product that does seem limited to industrial applications, but familiar to most people in a variety of situations is the ST signal tower. Used mainly for showing the status of a process or machine, or even in supermarkets to show the operational condition at a checkout, the signal tower provides up to five luminous indicators or four indicators and a sounder in a vertical stack with light sources based on either xenon or LED technology.

Industrial Catalogue

The industrial and commercial markets share the same technologies and in many cases identical

products are acceptable in either type of situation. However, in those applications characterised by harsher and specialist environmental conditions, products need to be designed/adapted. Higher sound and light outputs and protection from exposure to extremes of conditions mean that only products purpose-designed to meet those conditions can be deployed. This is the driving force behind the introduction of a new catalogue by Fulleon and sister company MEDC, including American specification products from Wheelock, another company within the Cooper Group.

While the compilation of the catalogue brought about lengthy discussions on what constituted an 'industrial' product, it is a concerted attempt to identify those products which are particularly suited to meeting the needs of industrial applications, however difficult it might be to pin down the term. IFP

Punitive fines for

Fireco's new System-X

A little over a year after the introduction of sweeping new fire regulations the first prosecutions under the RRFSO (Regulatory Reform Fire Safety Order) are being brought, and the penalties are proving to be punitive.

Last November an Essex company was ordered to pay fines and costs totalling almost £41,000 after pleading guilty to breaches of fire safety regulations at their premises, in particular fire doors wedged open and exits obstructed.

Commenting on the case, the fire service commander said: 'I would also like to remind those responsible for properties of the need to carry out a full and comprehensive risk assessment and emergency plan.'

This is timely advice and highlights a worrying trend identified recently by the 'Kick the Wedge' survey conducted in response to the RRFSO. This comprehensive UK wide fire safety survey, commissioned by Fireco Ltd. Manufacturer's of Dorgard, revealed that nearly 70% of business premises audited for fire risk were found to be wedging open fire doors.

Unaware of the regulations

These grim findings have also been confirmed by Norwich Union Risk Services who carried out a post-RRFSO study last May showing that more than a third of businesses were unaware of the regulations. The study also revealed that over a third of businesses had failed to carry out a Fire Safety Risk Assessment, a procedure crucial to compliance under the Order.

£250,000 fine for fire safety breaches

A record £250,000 fine for breaches of fire safety law, imposed last year on a major UK retailer, is an example of the seriousness with which fire door wedging is regarded by the enforcing authorities. In this case the fire safety offences were deemed so serious that the case was referred to the Crown Court for sentencing.

The evidence produced by the fire and rescue service was damning. Vital exits – critical for life safety – were wedged open with beer cases and other objects. The sheer number of offences indicated 'a fundamental breakdown of the company's fire safety management procedures at the highest levels.'

wedging fire doors

Wedge Pledge campaign

These worrying trends highlight the importance of Fireco's Wedge Pledge, a major new campaign that aims to eliminate the highly dangerous practice of wedging open fire doors, which – in a real fire emergency – would allow smoke and flames to spread rapidly with the risk of life-threatening injuries. Fireco is asking businesses to send them their illegal fire door wedges and receive £5 off every Dorgard – the legal, wireless hold-open solution for holding open fire doors. PLUS Fireco is pledging to donate £1 for every Dorgard sold from the campaign that's expected to raise thousands of pounds for burns charities that care for victims of fire.

Affordable wireless fire safety solutions

Clever thinking based on good sound research, an understanding of marketplace demands and the significance of new fire legislation are the drivers behind Fireco's growing portfolio of brilliantly practical, affordable wireless fire safety solutions that include Dorgard and Deafgard.

Fireco's latest, ambitious R&D programme includes an exciting range of products that will bring new, innovative technologies to fire safety.

This smart communication system uses the very latest radio technology to automatically signal a fire alarm condition to a range of innovative linked products.

The first of these is System X, a central radio-interlinked system to control automatic door release that can be installed to comply with BS 7273-4 Category B. This smart communication system uses the very latest radio technology to automatically signal a fire alarm condition to a range of innovative linked products, including Dorgard X and Deafgard X, within a 100m site specific range.

How does it work?

At the heart is the System X transmitter unit (TX) that is positioned beside the fire alarm bell or sounder. On identifying a fire alarm condition the unit automatically sends a radio signal to all Dorgard X and Deafgard X units within range. As each Dorgard X unit receives a signal from the System X unit it releases the fire door it is holding open, allowing it to close and preventing the spread of fire and smoke. As each Deafgard X bedside unit receives a signal from the System X unit, the high intensity strobe LEDs and connected vibrating pillow-pad are activated. The flashing LEDs and LCD provide visual indication that the fire alarm is sounding, alerting the deaf or hard of hearing user to leave their room to a place of safety.

Fireco's new System-X

One of the great advantages of System X is that there's no limit to the number or mix of X products that can be sited within range of a System X transmitter unit. A site survey must however be carried out prior to installation and Fireco will be providing approved installers with a System X site survey kit. System X is designed for use in all sectors, but is particularly suited to noisy environments such as pubs, bars and restaurants where the sound of a fire alarm could be masked by high levels of background noise. Features include fail to safe, night time release and 1 year battery life.

Approvals and standards:

BS EN 1155: 1997 building hardware

Electrically powered hold-open devices for swing doors. (Manufacturer's classification number 357113.)

EN61000-6-1:2001

Electromagnetic compatibility (EMC). Generic standards. Immunity for residential, commercial and light-industrial environments

EN61000-6-3:2001+A11:2004

Electromagnetic compatibility (EMC). Generic standards. Emission standard for residential, commercial and light-industrial environments

System X can be installed to comply with BS 7273-4 Category B.

Cost-saving installation

System X offers specifiers and installers greater flexibility when managing a building's fire safety. One of its major benefits is that by using wireless technology System X delivers significant savings in time and cost of installation, when compared with hard-wired systems. Disruption to occupants is minimised because System X requires no on-site alterations to the building's fabric. In fact, the cost of a comparable hard-wired solution could be between 150 – 400 percent higher than the installation of a Dorgard X unit.

Flexible programming

System X allows a range of operations to be programmed through the transmitter unit. Fire doors retained by Dorgard X within the transmitter range

Damning evidence. Vital exits – critical for life safety – were wedged open

can be programmed to release automatically at a pre-selected time, with programming achieved through the System X unit's six-button keypad. In the case where multiple System X units have been installed, idents for the additional system(s) are set to ensure the unique identity of each configuration. Other programming features and functions

Fire doors retained by Dorgard X within the transmitter range can be programmed to release automatically at a pre-selected time

include: range testing and timer settings with built-in self-testing diagnostics initiated every seven days, and fail-to-safe door closure.

Automatic night time closing

System X can be programmed with a night-time release setting to release doors to close, with warning tones, at a pre-set time. Critically, as a safety measure, this time-set period can't be breached and the Dorgard X units will not operate in their hold open function until a later pre-set time is inputted.

Dorgard X and Deafgard X are the radio versions of Fireco's established range of fire safety products

Dorgard is the wireless solution that offers the simplest, most cost-effective way of legally holding open fire doors safely in any position, automatically releasing them should the fire alarm sound. With more than 250,000 units sold in the UK alone, Dorgard is acknowledged as an established technology offering a solution in any environment. Dorgard complies fully with all relevant British Standards, EC Directives and UK Fire Regulations.

Deafgard is a wireless, acoustically-triggered bedside unit that uses high-intensity strobe LEDs and a connected vibrating pillow pad, that when placed under the pillow, vibrates to wake the sleeper upon the fire alarm sounding. Flashing strobe LEDs and LCD provide visual indication that the fire alarm is sounding, alerting the individual to leave the building to a place of safety. One of Deafgard's great advantages is its moveability, meaning that no alterations need to be made to individual rooms. Deafgard assists in complying with elements of the DDA, and is designed to respond to a fire alarm installed in conformity with the British Standard 5839 Part 1. It is also designed to comply with the relevant parts of BS 5446-3. IFP

For more information about Fireco's products and services please call **0870 8500085** or visit www.firecoltd.com

Holding the Line

Maintaining Fire Safety on London Underground

Maintenance is a major issue for all businesses, particularly since the enactment of the Regulatory Reform (Fire Safety) Order in October 2006. But it takes on a whole new dimension when the maintenance responsibility is for systems that ensure the fire safety of 500 million passenger journeys every year. Here, Mick Gay, Senior Project Manager with M J Quinn Integrated Services Ltd, sheds light on what is involved in maintaining the fire systems for Tube Lines Limited on the Jubilee, Northern and Piccadilly lines for London Underground, and why 7pm on 5th February 2006 is indelibly etched on his brain.

By Mick Gay

Senior Project Manager, M J Quinn Integrated Services

The Jubilee, Northern and Piccadilly lines together carry 40 percent of London Underground's passengers. The statistics are staggering: in the average working day there are over 400,000 passenger journeys on the Jubilee line; 660,000 on the Northern line; and more than 530,000 on the Piccadilly line. Tube Lines Limited, which is working in partnership with London Underground is investing over £4.5 billion in rebuilding all three lines; the largest improvement programme the Tube has ever seen. It is one of the world's biggest capital infrastructure projects.

Understandably, with numbers like these, maintenance is a major concern. Certainly it is high on the corporate agendas at both Tube Lines Limited and London Underground, which is responsible for operating the network. It is a task of possibly unrivalled proportions, and undoubtedly one of the country's toughest maintenance challenges.

It involves no fewer than 147 separate sites – including tenanted outlets in the stations – and in excess of 18,500 individual pieces of fire detection, fire alarm and firefighting equipment. This embraces everything from portable fire extinguishers, fire blankets, sounders and call points, to control panels and fixed suppression systems, up to and including links to the stations' public address systems. It is made more complicated by the fact that, over the years, a considerable number of unrelated systems and components have been installed, from a variety of manufacturers, and with any number of different operation procedures and protocols.

The challenge is further compounded by several other factors unique to the Tube that focus attention on maintenance. It is in operation around the clock, 365 days a year and, under the PPP (Public Private Partnership) fines can be imposed on Tube Lines Limited if stations have to be evacuated because of a failure of the fire detection and alarm equipment.

All of which places very onerous responsibilities on the maintenance contractor.

Skill set and experience

Such a challenge called for the contractor to have a particular skills set, a high degree of commitment, and a willingness to work in genuine partnership with Tube Lines Limited.

M J Quinn had to establish several critical performance characteristics. With the plethora of systems and components spread across the sites, we had to demonstrate technical competence and knowledge of the various protocols. As a specialist fire safety contractor that meets the rigorously applied standards of such authorities as the LPCB and NICEIC, we have invested heavily in training, and this is reflected in our training facility in London. Here, our engineers gain hands-on experience of the many different fire detection and alarm systems.

Not that the demanding requirements of London Underground were entirely new to us, we have, at one time or another, worked on the majority of the stations on the Underground network. Such is the breadth of our offering that we have undertaken: the rewiring of complete stations; the installation of complete fire detection and alarm systems; fire compartmentation and passive fire protection projects; and the installation of communication, fibre optic and CCTV systems.

Management expertise

Technical competence though had to be matched with planning expertise and fail-safe procedures. So, the company harnessed the power of its specially-enhanced, computer-based planning software that we had utilised and refined on other major planned preventative maintenance contracts. Working closely with the software developer, ICU Group, we structured our Qu-Trak programme to support the 24/7 service call desk that the company set up for the Tube Lines Limited contract, as the central point of contact for all maintenance issues.

In addition to being essential to the smooth running of the maintenance regimes, this programme is now also used to generate the daily reports required by Tube Lines Limited to download onto its own management programme. This ensures that Tube Lines Limited constantly has an accurate overview of the maintenance work undertaken on its behalf. Qu-Trak also forms the basis of asset verification and condition checking procedures; and produces the KPI – Key Performance Indicator – data that is part of the companies quarterly reviews with Tube Lines Limited.

The comprehensiveness of this information and the speed that it is being delivered is enabling Tube Lines Limited to retain a constant management overview of the entire maintenance operation. Tube Lines Limited's Scott Vernon, who has headed-up the team at Tube Lines Limited since negotiations started, is on the record as saying: "This level of communication on maintenance issues is undoubtedly helping Tube Lines Limited to achieve its own contractual, line availability and reliability targets. We are committed to delivering excellence to London Underground, and the way in which we are working together, with a shared agenda, is improving our long term planning and

performance, and supporting the output commitments Tube Lines Limited has made to London Underground."

Qu-Trak also provides a complete and reliable audit trail of all maintenance activity. While this underpins Tube Lines Limited and London Underground's commitment to passenger and staff safety, it is also an important contribution towards ensuring compliance with the recently introduced Fire Safety Order, which requires system maintenance records to be documented.

Our commitment was demonstrated early in the five-year contract by the speed with which the maintenance challenge was immediately taken on board on D-Day – 7pm on 5th February 2006. Having initially expected a 13-week mobilisation period before accepting responsibility for call-out maintenance, this was slashed to a mere three weeks, and the responsibility for planned preventative maintenance was shouldered in just four weeks.

During this greatly reduced timescale, we seamlessly integrated more than 40 staff into the company from the previous maintenance provider, implemented fast-track training programmes, and brought about the embracing of the company's customer service culture.

Monitoring performance

This has enabled M J Quinn to meet Tube Lines Limited expectations and performance criteria.

Response time is set at being within one-and-a-half hours for any non-station-closure incident, while component or system faults that may result in the need to close the station are dealt with immediately. This has resulted in the cost of station closures falling from previous levels that were in excess of £100,000 a year to less than £2,000 a year, with an obvious reduction in the inconvenience caused to London Underground's passengers. These charges have particular significance for us; if what Tube Lines Limited refers to as the "lost customer hours" are down to a failure to rectify a fault in the agreed timescale, we have to meet the cost.

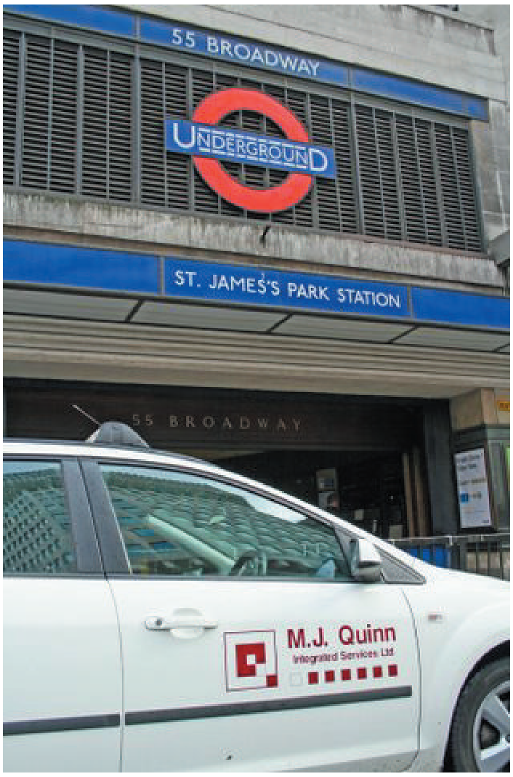
To monitor the company's achievement against the agreed performance criteria, Tube Lines Limited management has put in place a number of KPIs. These Key Performance Indicators cover several critical aspects of the contract, including: performance considerations; health & safety matters; technical issues; fault rectification; execution; and planned preventative maintenance. The KPI on performance considerations, for example, keeps a watchful eye on the maintenance spending for each line, which must remain within three percent of the target for the performance to be assessed as "green". The health & safety KPI looks at lost time due to accidents and the overall safety record, which so far stands at zero. The response time KPI measures the all-important call-out track record.

To date, with the exception of a couple of "amber" assessments on relatively minor issues, we have consistently achieved a previously unprecedented "green" performance in all areas.

Commitment and partnership

This has placed maintenance of Tube Lines Limited's fire safety provisions on an entirely new footing.

The potential for equipment failure or malfunction is now anticipated, which is having a major



positive impact on cost and passenger satisfaction. Faults are immediately flagged-up, and appropriate action is taken quickly, despite the Underground being what can only be described as a challenging working environment.

Such a scenario would not have been possible without both us and Tube Lines being committed to a genuine and lasting partnership approach to the task. In a commercial world where the term "partnership" has been devalued through misuse, this is a refreshing change that is bringing out the very best in the relationship. Interestingly, neither party has ever felt it necessary to quote contract terms to the other! We have an "open book" policy with Tube Lines Limited, and share a common agenda and a mutual dedication to safety. It is a relationship that thrives on visibility of thought, word and deed.

This positive, totally committed and non-adversarial approach by Tube Lines Limited has empowered M J Quinn to be proactive, seeking opportunities to improve the service it provides to Tube Lines Limited and anticipating future maintenance needs. Where once the onus for reporting repeat faults fell to Tube Lines Limited, we now shoulder this burden. Frequently, this proactive attitude has resulted in us resolving maintenance issues at stations outside of those included in our contract.

In addition to providing this all-embracing maintenance package to Tube Lines Limited, an additional focus during the first year of the contract was on establishing an accurate catalogue of the lines' entire fire asset list and ascertaining the condition of each and every piece. This included, for example, barcoding all of the portable extinguishers, and carrying out compartmentalisation inspections. In the second year, this moved on to accepting responsibility for a further 21 Underground stations and adding enhancements to the company's service offering. IFP

Mick Gay is Senior Project Manager with M J Quinn Integrated Services in London. He joined the company in January 2006, at the start of the Tube Lines Limited contract, and is responsible for its day-to-day management. He is a qualified fire engineer and, prior to joining M J Quinn, worked for London Underground, Network Rail and Tube Lines Limited, implementing major fire safety improvements.
M J Quinn can be contacted by telephone on 020 845 30450 or via email at info@mjquinn.co.uk

Exporters need m assistance insists

Wilf Butcher, Chief Executive of the Association for Fire Protection (ASFP) has criticised the Government for its lack of support to British construction industry product manufacturers who market their materials abroad.

By The Association for Specialist Fire Protection (ASFP)

Speaking at the All-Party Parliamentary Fire Safety and Rescue Group seminar at Westminster, he stated that recent research showed the fire protection market had grown from £2 billion in 2001 to £3 billion in 2006 with the active fire protection sector (e.g. fire alarms and fire extinguishing) representing £1.2 billion and 'built in' fire protection sector (e.g. structural protection and compartmentation) accounting for £1.8 billion. But he queried if the export of British manufactured fire protection products and systems meant a great deal in the order of things and if the Government was at all concerned by its diminishing investment in continued overseas business generation?

It could be argued, he claimed, that the fire industry has traditionally had a helping hand in the endeavour, since many of the major markets that the British industry sells to, such as the Middle East and the Far East, have based their standards on those developed in the UK. But whilst that may have been true in the past, he warned, it is by no means the case any longer. Progressively and systematically, he pointed out, British/European standards are losing ground to American standards. Not just in the markets that have unfolded over the past ten years, but also in established markets and the reason is a very simple. It boils down to whether overseas specifiers are prepared to pay for British Standards, which collectively can run into thousands of pounds, or whether they opt to take advantage of Standards which, in some quarters, are offered and supported free of charge.

The British fire industry is playing an absolutely pivotal role in developing the UK's fire industry stance within Europe and it is investing millions of pounds in the testing process as it proceeds.

ore government ASFP CHIEF

This is the current choice presented to specifiers on major projects around the world, he claimed. Do they continue to adopt standards recognised over many years, or do they embrace the American model and take advantage of all they proclaim to offer at no 'apparent' cost? This is not a theoretical debate, he urged. The issue is real, happening now and it is affecting the whole of the British construction industry.

The British fire industry is playing an absolutely pivotal role in developing the UK's fire industry stance within Europe and it is investing millions of pounds in the testing process as it proceeds. The result is a unified European market where all member states can trade freely under a single European harmonised standard regime. Such significant investment, however, will count for nothing if American standards continue to erode the UK's international markets. The alternative will be that we will be forced to re-invest into testing to American standards, or lose these markets altogether and this applies to British industry as a whole!

So, he queried, how is government assisting in averting the problem?

Seven years ago the UKT&I (UK Trade and Investment) recognised the significance of supporting the UK fire industry and created the Fire Industry Export Council. By working in partnership with each other many successful export initiatives were developed. These, in turn, assisted many UK fire companies to move into the global marketplace. Following a recent government appraisal designed to evaluate the strategic importance of each facet of British Industry, however, the fire industry found itself in spot number 35 (second from bottom) in the pecking order of industry group importance.

In 2007 Government funding all but dried up and now we learn that there is to be zero funding in 2008! As if to exacerbate the situation, British embassies are now under extreme pressure to sell their services to British Exporters, so we now face the double whammy of no export support and any work undertaken on behalf of British industry, by our embassies, is chargeable.

A good method of assessing Government support, he suggested, is to compare the way in which European countries sponsor their industries at international exhibitions. Until very recently, the annual government investment in supporting UK companies at international exhibitions was in the order of £20 million. In 2007 the sum was reduced to £8 million and funding ran out within five months. In 2008 funding will remain at £8 million, but how long will it last this year? Germany's investment this year, for example, stands at £25 million to support some three hundred trade shows. Arguably, this may be a reason why the 2007 'Big Five' exhibition in Dubai witnessed over 300 German exhibitors, whilst less than 70 attended from the UK

Exporting is a partnership between industry and Government and the two are inextricably entwined. The message is a clear one. If the Government is serious about supporting fire industry export initiatives, it needs to listen to the people who know and understand the market.

What is suffering, he warned, is exposure of British manufacturers in the international arena. In fire technology, British manufacturers are renowned as worldwide market leaders, but such disparity in funding is simply encouraging our competitors to storm straight past us.

Exporting is a partnership between industry and Government and the two are inextricably entwined. The message is a clear one. If the Government is serious about supporting fire industry export initiatives, it needs to listen to the people who know and understand the market. Investing hundreds of thousands of pounds setting up new quasi bodies is not what this industry needs. Fire UK is not asking for preferential treatment. It is asking for an even playing field to let us get on with the job. IFP

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Foam fire fighting systems - we've got it covered

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THE GLOBAL VOICE FOR PASSIVE & ACTIVE FIRE PROTECTION

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Front cover courtesy of Total® – Tyco Fire Suppression & Building Products

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SITA Awarded LPCB Approval

After extensive product testing, the Loss Prevention Certification Board (LPCB) has awarded RAFIKI's Sita intelligent addressable fire detection system with LPCB approval.

The Sita 200 Plus from Rafiki is a fire detection system which allows up to 200 detectors and sounders to be connected on one loop, a specification currently unmatched in the marketplace. It features a maximum loop length of 2km, a fast short circuit isolator in every device and digital communication with high power transfer. Sita can be pre-configured on a PC or via a control panel on site, and for added flexibility there is a choice of up to 15 combinations of smoke or heat detection.

Certification by the LPCB is a mark of excellent quality and safety. The LPCB is the leading international certification body in the fields of security and fire protection, and is recognised by governments and regulatory authorities across the world. Product approval is also maintained by regular product audits.

Commenting on the certification, Rafiki managing director Bill Amlani said, "The LPCB approval is a worldwide recognised standard of excellence and we are very pleased to have achieved this with Sita. The Sita system can support 200 multipoint combined detectors and sounders on a single loop, and importantly Sita equipment is easy to install, commission and maintain."

Further information is available from Rafiki Protection Ltd, telephone 01633 865558, by emailing phil@rafiki.biz or by visiting the company's website www.rafiki.biz

Rockwool Opens New London Headquarters

As part of a major £70 million expansion plan, ROCKWOOL – the market leading manufacturer of stone wool insulation solutions – has announced the opening of a new corporate and marketing headquarters in Hammersmith, London.

Managing director, Hans Schreuder, will be based at the new HQ, together with Rockwool's corporate and marketing teams. Schreuder was appointed in May 2007 to oversee the expansion of Rockwool's UK operations to meet growing demand for the company's market leading products and solutions in the UK and Ireland.

Commenting on the move, Hans Schreuder said: "Rockwool has aggressive targets for growth in the UK and we see expanding our UK operations to London as a key part of this process.

"In addition to sending a positive message to the industry and investors, it will provide a strong base to lobby UK legislators and regulators, as part of our on-going campaign for greater transparency and clarity in fire safety and wider building regulations."

As well as establishing a new London HQ, Rockwool is also currently doubling capacity at its manufacturing facility in Bridgend, South Wales, which will be complete by the end of 2008.

This large-scale expansion programme will include the installation of a third, technically-advanced production line, which will significantly increase Rockwool's capacity and create 110 new skilled jobs.

In addition, the investment programme will also see the creation of new warehousing, technical support and distribution facilities to support the increased capacity and ensure a responsive and flexible service, industry wide.

For further information contact:
Rockwool Limited
Website: www.rockwool.co.uk

SYNCRO MATRIX is a revolution in fire alarm mimic display technology

Syncro Matrix from KENTEC uses flexible, fibre optic light guides to illuminate areas on a fire alarm mimic display floor plan, laid over a high-resolution grid and it can be connected to any panel in Kentec's Syncro and Syncro AS fire alarm panel range. Syncro Matrix is also uniquely flexible and future-proofed as it completely dispenses with wiring, enabling indicators to be moved, removed or added on site.

Syncro Matrix can be supplied with or without LEDs and controls. Optional LEDs indicate Power on, Fire, Fault and Disablement and optional controls are for Alarm silence, Buzzer silence, Lamp test and Reset.

Housed in attractive, slimline enclosures to match Syncro and Syncro AS fire alarm panels and with high quality, full colour or monochrome floor plans, Syncro Matrix provides a clear, geographical indication of fire alarm activation enabling speedy identification of the source of an alarm.

Syncro Matrix from Kentec – a clear, geographical indication of fire alarm activation for speedy identification of the source of an alarm

For more information please contact Kentec on +44 (0)1322 222121
Email: robine@kentec.co.uk or visit www.kentec.co.uk

New Total® Foam Portables meet industries' needs

The new TOTAL® range of premium-build foam portable fire extinguishers includes two industry-standard models, an antifreeze-protected portable, an environmentally-friendly cartridge-operated extinguisher, and a special-application foam portable specifically designed to fight polar liquid fires.

The two industry-standard models are 6-litre and 9-litre portables that are suitable for both Class A fires that involve wood, paper, straw and textiles, and Class B flammable liquid fires involving petrol, tar, paints and oils. The Kite-marked and BAFE-approved AFFF (Aqueous Film Forming Foam) extinguishers are also Wheel-mark certified for use in maritime environments. Significantly, they leave no particulates or harmful residue and so have zero effect on the earth's ozone layer. The antifreeze-protected version of the 6-litre portable can withstand temperatures as low as minus 20 degrees C and so is ideal for use on forecourts, loading bays, quaysides and in warehouses.

The TOTAL Eco Range 6-litre foam portable offers users a major environmental bonus, as the foam concentrate is completely encapsulated within a cartridge inside the extinguisher. This maximises the life of the foam concentrate. The cylinder is pressurised only when in use, and the foam is propelled by CO_2 (Carbon Dioxide). The cartridge can be removed from the cylinder prior to discharge for testing and re-use, and it can be environmentally-friendly recycled at the end of its working life.

In addition to these "standard" foam portables, the new special-application 6-litre TOTAL foam portable is effective on a whole raft of polar liquids, including alcohol, methanol, acetone, propanol and ethanol. It is specifically designed to fight polar liquid fires that are prone to occur in cosmetic, pharmaceutical, and adhesive production environments, and in distilling industries. It should also be of particular interest to manufacturers of household, commercial and industrial cleaning products and disinfectants.

This portable overcomes the ineffectiveness of conventional foam extinguishers on polar fires by the use of a specially-formulated foam agent developed by TOTAL, and the incorporation of a nozzle designed to deliver the optimum foam density. It too is part of the TOTAL Eco Range offering, encapsulating the foam concentrate within a cartridge inside the extinguisher.

All of these new foam portables were developed at the dedicated TOTAL portables research and manufacturing facility in Neuruppin in Germany. Virtually every stage of cylinder manufacture is under the direct control of TOTAL, including material selection and sourcing in Europe, the most advanced low-heat plasma welding, fabrication, assembly and high-performance powder-coating, 100 percent cylinder pressure testing and agent filling. This commitment to quality is underpinned by uniquely numbering each and every cylinder to provide a complete and reliable quality audit trail.

All TOTAL portables are manufactured from specially formulated steel that remains flexible after forming and welding. The one-millimetre-thick internal powder coating is widely recognised as the industry's most hardwearing surface. Every cylinder is electrode-tested to ensure that there are no pin-point flaws in the coating, and the quality of the finish can be judged by the fact that there is a complete absence of colour fading that is a common feature of many inferior quality cylinders. Even the cylinder wall-mounting brackets are designed to ensure that there is no metal-to-metal or metal-to-wall scuffing.

TOTAL portables are guaranteed for five years, providing they are serviced from new in accordance with the appropriate regulatory standards. IFP

TOTAL portables are available in the UK through Express Fire in Manchester on 0161 688 5050, or from Tyco Fire Suppression & Building Products on 01493 417600.

NOTIFIER to Showcase Mass Notification and Complete Line of UL 864 Ninth Edition Listed Fire Systems at NFPA World Safety Conference

NOTIFIER, a world leading manufacturer of commercial fire alarm technology and systems, will exhibit its new Mass Notification solutions product line and its UL 864 Ninth Edition listed ONYX® Series of intelligent fire alarm control systems at the upcoming NFPA World Safety Conference & Exposition, June 2-4, 2008, at the Mandalay Bay Convention Center in Las Vegas, NV.

In the event of an emergency, NOTIFIER Mass Notification systems broadcast live, up-to-the minute emergency information to everyone in a building, campus, and surrounding area to help prevent injuries and save lives. For multiple buildings or campuses spread across a city, state or even the globe, NOTIFIER has harnessed the latest Voice over IP (VoIP) technology, delivering live voice messaging to anywhere in the world via the Internet. NOTIFIER Mass Notification systems fit a wide range of facility types and applications including K-12 schools, high-rises, and mass transit hubs, as well as college, university, and manufacturing campuses.

The ONYX Series of intelligent fire alarm control panels speeds alarm response, simplifies maintenance and usability, and maximizes flexibility. The ONYX Series is comprised of the NFS-320 for small applications such as restaurants, strip malls, and standalone retail facilities, the NFS2-640 for mid-size applications like office buildings, assisted living facilities, and school buildings, and the NFS2-3030 for larger installations such as high-rise buildings, hospitals, shopping malls, and airports. The ONYX Series is also the only complete line of fire alarm control panels in the industry that meets the new UL 864 Ninth Edition standard today.

All ONYX Series panels features NOTIFIER's patented FlashScan® intelligent device polling protocol, which exceeds worldwide code requirements for response time. This, combined with ONYX Intelligent Sensing technology, an integral part of all ONYX Series panels, ensures a faster response to smoke and heat conditions while substantially reducing nuisance alarms. Each panel also offers built in synchronization protocol for System Sensor, Wheelock, and Gentex notification appliances.

Learn more about NOTIFIER Mass Notification Solutions, the ONYX Series, and UL 864 Ninth Edition, visit NOTIFIER at booth 1015 at the NFPA World Safety Conference and Expo, June 2-4, 2008, at the Mandalay Bay Convention Center in Las Vegas, NV

Hochiki Commemorates 90 Years Of Fire Safety

HOCHIKI EUROPE, the UK-based subsidiary of the Tokyo-based Hochiki Corporation, which designs, manufactures and markets a broad selection of fire detection and alarm products, is commemorating the Japanese company's 90th year in the fire safety business.

Founded in 1918, the company installed Japan's first public fire alarm in 1920 and developed the world's first addressable manual call point. Today, it is an international business with an annual global turnover in excess of £400 million. Currently it manufactures more than five million detectors every year, and has the largest fire test laboratory in the world.

Hochiki Europe was established in the UK in 1992 and is headquartered at a purpose-built facility in Gillingham, Kent, from where it manages Hochiki's extensive business interests throughout the EMEA region, Russia and the Commonwealth of Independent States, and the Indian subcontinent. With more than 100 employees, the UK-based operation presently produces annually in excess of 800,000 conventional and intelligent detectors and ancillaries.

Commenting on the anniversary, Hochiki Europe's Managing Director, Ms Minako Adachi says:"Hochiki Corporation's history is one of dedication to improving life safety and the protection of property. Our continuous investment in developing new and ever more reliable technology for the early and accurate detection of fire demonstrates that 90 years later Hochiki is still as committed to improving life safety across the world." She continues: "In the past year we have introduced several new products and have expanded our UK and international sales teams to enable us to provide enhanced service levels to our trading partners."

Further information is available by telephone on +44 (0)1634 260133, or via email at news@hochikieurope.com. The company's website is at www.hochikieurope.com

Draka Offers Greater Choice and Superior Service

Draka, the Derby-based cable manufacturer, now provides the market with the widest possible choice of low voltage cable, following the implementation of a pan-European manufacturing strategy focused around how best to meet the market's needs in every country.

The company has harnessed its entire pan-European manufacturing capability for the benefit of all of its customers. This provides every Draka customer, in every country, with access to the production resources of 13 separate low voltage cable manufacturing plants, the latest of which is in the Czech Republic and is arguably the most advanced building wire plant in Europe. This has several customer benefits over the approach more commonly adopted within the cable industry, which is to implement a narrow country-by-country policy, where each country's manufacturing plant operates in virtual isolation. With Draka, customers can choose from the market's broadest selection of world-class products, and they are ensured of consistently high cross-boundary quality.

At the same time, the company has launched two new cables. Both complement the company's award-winning Firetuf range of performance cables that today embraces low voltage (cables up to 1kV) building wires and power cables that are available throughout the UK, Ireland and the Middle East.

Saffire is a new generation of 0HLS – Halogen Free – cable that sets a new and higher level of fire safety performance, while Firetuf Powerplus is a new 600/1000V SWA (Steel Wired Armoured) power cable that provides enhanced circuit integrity performance. It meets the demanding requirements of BS 7346-6:2005 and the more stringent demands of, for example, the UK's Approved Document B (Fire safety) 2006 of the Building Regulations for England and Wales.

Saffire 0HLS enables consultants to specify cable that provides enhanced safety in line with the latest fire safety legislation, and greatly assists in identifying that superior fire safety is being incorporated into a building. Saffire 0HLS also sets a new benchmark brand for third-party approved fire safety cabling, extending the safety benefits of 0HLS cables to a much wider marketplace.

Increasingly, fire safety systems require a secure power supply that will retain its integrity in the event of fire, which highlights the imperative need for enhanced performance power cables. Such systems include: automatic fire suppression installations; fire detection and alarm systems; fire compartmentation; smoke control and ventilation; sprinklers and wet risers; ventilation and shutters; and firefighting lifts.

In Firetuf Powerplus, Draka has developed a solution that uniquely meets this requirement. It utilises high-performance materials to achieve BS 7346's

maximum 120-minute rating when subjected to integrated testing involving flame irradiation exposure, direct impact and high-pressure water spray. It has been introduced to provide the superior performance characteristics required by today's sophisticated fire engineering solutions that are becoming increasingly commonplace, and the more widespread utilisation of fire engineering principles and techniques that call for greater reliance on complex life and property protection systems and protocols.

New catalogue and cables handbook

Draka has also published its latest all-products catalogue. It runs to a full 108 pages and describes in detail the company's entire range of third-party approved cables that meet the demands of the vast majority of construction and industrial applications. This includes house wiring and low voltage supply cables for use in domestic, commercial, retail, healthcare and leisure sector buildings. It also covers specialist communication and data transmission cables, and Draka's market-leading fire performance cables that are used extensively for safety-critical applications within the general construction, petrochemicals, security and mass transit sectors.

The company has also published the 2008 edition of its cable and table handbook called *A Closer Look at Cable*. It runs to over 200 pages and, like its predecessor, is expected to become essential reading for anyone involved in specifying or installing cabling – architects, fire engineers, system designers and installers. IFP

Full details on **Draka** products are available by telephone on +44 (0) 1332 345431, by fax on +44 (0) 1332 331237, and via email at firetuf@draka.com. The company's website can be found at www.drakauk.com

This June more than 5,000 fire and life safety, electrical and security professionals will convene in Las Vegas for NFPA®'s World Safety Conference & Exposition® (WSC&E®) – and it's sure to be a hit! With annual attendance increasing by 137% since 2003, the WSC&E is the undeniable industry leader in the fire, life safety and electrical sectors. This event is truly like no other – it offers an unrivaled educational experience, networking opportunities and invaluable solutions to your on the job challenges.

The Education Conference

This year's conference will feature more than 150 education sessions within 11 conference tracks. In 2008 the special track on Fire Protection Engineering sponsored by the Society of Fire Protection Engineers (SFPE), will once again take place. In addition, the Building and Life Safety track will be expanded to offer more than 30 sessions. *The Building and Life Safety Track* concentrates on practical information needed by designers, engineers, and building and fire officials, such as plans review, inspection techniques, and updates on code requirements, new technologies, and best practices. Rounding out the conference tracks are:

- **Codes and Standards** – includes information on the reasons behind important code changes and how they will be implemented, and applies specific code requirements to particular occupancies.
- **Detection and Suppression** – Focuses on code requirements and design issues, the application of new technologies in alarm and suppression systems, and the impact of maintenance on systems performance.
- **Disaster Preparedness/Business Continuity** – Includes information on assessing risks and consequences, emergency preparedness, contingency planning, incident management, and recovery plans.
- **Fire and Emergency Services** – Includes current information on fire-fighting apparatus and technologies, safety and preparedness for first responders, incident command strategies, and fire prevention and inspection techniques.
- **Industrial Fire Safety and Security** – provides practical information centered on environmental health and safety, and loss prevention issues.
- **necforum™** – Considers new electrical design issues, successful maintenance programs, best practices in electrical contracting, effective inspection techniques, and practical electrical safety programs.
- **Premises Security** – Examines issues related to creating and implementing security plans, as well as designing, installing, and maintaining security systems.
- **Public Education** – Includes fire and life safety planning and strategies. Also offers the latest in safety education including challenges and creative solutions.
- **Research** – Considers the latest information available on many timely issues, such as video smoke and flame detection systems and reliability of water mist fire protection systems.

Spotlight Sessions

Within these 11 conference tracks are sessions that are highlighted due to their focus on current industry topics and relevancy. Enhance your professional growth and learn from leading authorities by attending one of these five Spotlight Sessions:

- Sprinkler Actuation with Low-Speed High-Volume Fans
- Health Care Occupancy Changes to the 2009 NFPA 101®, Life Safety Code®
- Recommendations of the U.S. Chemical Safety Board
- Things You Will Want to Know About the 2010 NFPA 72®
- CANCELLED – The Monte Carlo Fire – Challenges and Lessons Learned

The Exposition

The three-day product exposition will showcase many of the latest technologies and services from more than 300 of the top solution providers in the fire and life safety, electrical, and security industries. Knowledgeable representatives from these companies will be available to answer your questions and offer solutions to your most pressing challenges. The exposition provides attendees the

ideal location to see, touch and try products as well as meet with a company's technical staff. As always, the exposition is free when you register in advance.

Ask the Experts

This informal Q&A session held on the exposition floor is a great feature of the WSC&E. During this 2½-hour time period, NFPA staff will field code related questions from attendees. This helpful question and answer session offers you a chance to find solutions to some of your most pressing code related challenges. Make sure that you are available for this session on Wednesday June 4 from 11:30 am to 1:30 pm.

Pre-Conference Seminars

The *2008 NFPA World Safety Conference & Exposition* will officially begin on June 2nd, but many people find the lure of NFPA's pre-conference seminars hard to ignore. Some of these seminars will only be offered in Las Vegas and is a true compliment to attending the exposition. This year NFPA is offering 23 pre-conference seminars on Saturday, May 31, and Sunday, June 1. These seminars are priced separately from the main conference and are offered at a substantial discount from NFPA's regular seminar pricing.

- Six 1-Day Seminars are being offered on Saturday
  - Emergency and Standby Power
  - Emergency Evacuation for People with Disabilities
  - NEC® Changes
  - NFPA1/UFC – Spray Booth
  - NFPA 10, Standard for Portable Fire Extinguishers
  - Stallcup's Grounding & Bonding
- Ten 2-Day Seminars are being offered on Saturday and Sunday
  - CFPS Primer
  - Environment of Care BaseCamp
  - Fire Protection Plans Review
  - Fire Protection Systems and Equipment Maintenance
  - NFPA 1, Uniform Fire Code™
  - NFPA 1600, Disaster/Emergency Management and Business Continuity Programs
  - NFPA 70E®, Electrical Safety in the Workplace®
  - NFPA 921, Fire and explosion Investigations
  - Public Information and Media Relations
  - Sprinkler Hydraulics
- Six 1-Day Seminars are being offered on Sunday
  - Dust Explosion Hazards
  - Emergency Evacuation and Relocation
  - NFPA 1/UFC – Hazardous Material
  - NFPA 99, Health Care Facilities
  - Stallcup's High-Voltage Electrical Systems
  - Behind-the-Scenes Tour & Technical Presentation – JUST ADDED!

Association Technical Meeting Session

At the heart of the codes and standards development process is the technical committee report session. More than 25 documents are up for review this June including NFPA 101, Life Safety Code and NFPA 70E, Electrical Safety in the Workplace. Don't miss this opportunity to see the code making process in action. Documents that cover aircraft and airport facilities rescue and fire fighting, fire tests, forest and rural fire protection, building codes, life safety, hazardous materials response personnel, pyrotechnics and more will be voted on during these sessions. New for 2008, all technical committee members will receive a 20% off conference registration prices. In addition, a technical committee AND an NFPA member your discount is may be greater! For more information, visit nfpa.org/wsce.

Penn & Teller

General Session Special Presentation

During the WSC&E General Session on Monday, June 2 enjoy an amazing Las Vegas magic show featuring Penn & Teller. This dynamic duo is a couple of eccentric guys who have learned how to do a few cool things together. Together since 1975, their award-winning theater show has been a long-running hit on and off-Broadway. This duo has currently has a nightly show at the Rio All-Suite Hotel & Casino in Las Vegas.

Las Vegas

Although 'Vegas' may be notorious for gambling, did you know that Las Vegas offers much more than casinos and bright lights? When you travel to Las Vegas, you enter a world that will captivate you by its international flare, exquisite dining choices and many award winning shows. You are sure to be impressed by the unique building structures, massive hotels and the countless attractions, sights and sounds of this destination city. Flights to Las Vegas are relatively inexpensive; couple that with endless dining options and reasonable hotel rates, and you have a perfect destination for any company budget. Come to the 2008 NFPA World Safety Conference & Exposition for an incomparable learning experience, and be sure to explore all that Las Vegas has to offer. Find out more at nfpa.org/wsce! IFP

FIRERAY 5000 from Fire Fighting Enterprises

Underwriters Laboratories Inc. has evaluated and listed their first motorised beam detector as compliant with the American National Standards for safety. The FIRERAY 5000 from FIRE FIGHTING ENTERPRISES now boasts certification from UL in addition to LPCB, VdS, CPD & EN54:12, breaking new ground in the development of this smoke detection technology.

The F5000 incorporates several technological advancements that set it apart from previous detectors. A newly-developed motorised beam head works in conjunction with the sensor to automatically optimise the signal strength throughout the life of the unit. This works to keep the beam aligned with the reflective prism even in the event of gradual building shift, and can also factor in environmental factors such as dust build-up. These features strengthen false alarm immunity over time, and help to reduce the need for maintenance operations.

These new additions for the F5000 improve its functionality, whilst it retains the benefits intrinsic to the tried, tested and trusted beam technology that has preceded it: large area coverage per unit (~19800 sq ft as opposed to ~900 sq ft for a point type detector), reduced cabling and installation costs, and minimal aesthetic intrusion.

The FIRERAY's low-level system controller is connected to the detector head by a two-wire cable, and can be used to fully control and adjust the beam – making installation significantly easier. The detector head houses both the transmitter and receiver, with the beam being bounced off a prismatic reflector on the opposite wall. Beam-type detectors are particularly suited to protecting wide indoor spaces such as warehouses, open-plan offices, corridors and meeting-halls. By covering large areas with few units, costs and disruptions caused by installation and maintenance can be greatly reduced, and the fire security system can be much less obtrusive – which can be of particular benefit in historic or stylish settings.

Fire Fighting Enterprises can offer a complete range of optical beam smoke detectors for all applications. Products include end-to-end, reflective and flameproof variants.

Further information and data sheets can be found on our website at www.ffeuk.com

Draka's cable performance helps bring dome back to life

DRAKA has played an important part in breathing new life into the old Millennium Dome in Greenwich. It has supplied 80 kilometres of its award-winning Firetufplus "enhanced" fire rated cable for the renamed O2 arena's sophisticated fire detection and alarm system that will protect concert goers and sports fans. The cabling was used by Epsom-based Carmel Building Services to install over 900 smoke detectors, 50 call points and eight networked control panels throughout the venue.

O2, which is owned and operated by AEG (Anschutz Entertainment Group), is being heralded as "Europe's finest indoor music and sports venue". When it opens later this year it will host a variety of mega-star entertainment events, including Justin Timberlake and Scissor Sisters concerts, and a host of major sporting events including, ice hockey, basketball, tennis, gymnastics and boxing.

Described by AEG as "a city-within-a-city", the O2 arena will be surrounded by an entertainment district that will open to all, night and day. This will comprise a number of leisure attractions, including an 11-screen cinema, exhibition space, an indigo music club, restaurants, bars and cafés, all lining an avenue as wide and long as Bond Street.

With such a complex redevelopment of the 365-metre diameter, 50-metre high dome, and with visitor numbers to events running into their tens of thousands, quality was the deciding factor when it came to selecting the fire rated cabling. According to Carmel Building Services' Ray Cavendish, Firetufplus was chosen "because of its proven performance and particularly because of its superior pliability, its robustness and flame retardancy".

Firetufplus exceeds the requirements of BS 5839 Clause 26.2e, providing 60 minutes fire and mechanical protection, followed by 60 minutes of fire, mechanical impact and water protection. In common with all Draka's Firetuf cables, its performance is verified by BASEC (British Approvals Service for Cables) and LPCB (Loss Prevention Certification Board) independent testing and approval.

It is an OHLS – Zero Halogen, Low Smoke – cable that meets the "enhanced" category of BS5839 – 1:2002. It is available in long lengths and has a twisted core construction to improve signal clarity. Other benefits that added to its attraction for the O2 arena contract included lower termination costs, legendary ease of handling and installation, and the lack of any need for special tools or training.

Derby-based Draka UK is the country's leading designer and manufacturer of fire performance cables, zero halogen power cables and building wires. The company is part of Netherlands-based Draka Holdings NV, which has over 9,000 employees worldwide.

Full details on Firetuf and other Draka products are available by telephone on +44 (0) 1332 345431, by fax on +44 (0) 1332 331237, and via email at firetuf@draka.com. The company's website can be found at www.drakauk.com

Mass Notification Solution for UK Naval Base

Cooper Notification – the platform which comprises Fulleon, MEDC, Wheelock, Roam Secure and MadahCom – has supplied the world's largest site-wide radio public address/mass notification system for HM Naval Base in Portsmouth.

The system was commissioned by the Royal Navy's facilities management company, Fleet Support Ltd, from Fareham based commercial sound specialists, Sound Advice PA Installations Ltd. The requirement was for an audio/visual site-wide personnel alerting system for Her Majesty's Naval Base, Portsmouth, including the site's Heritage Museum areas.

Extensive research was undertaken regarding the various signal distribution methods and a secure, wireless system proved to be the most economical solution. Although such systems are used throughout the world in US military bases, government buildings and high profile tourist attractions, this is the first of its type to be employed in the UK.

The system features three computer controlled base stations, providing full audio coverage over the entire 333 acre site. Some 255 digital radio transceivers and 570 loudspeakers allow both digital, pre-recorded messages and live speech to be transmitted to selected single radio units, multiple units (ie pre-defined zones) or throughout the whole site.

The complex layout of the site which includes dockyard buildings, cobbled streets, rail tracks, dry docks and historically significant buildings presented significant problems for the traditional approach. This would have involved extensive cabling between amplifiers and loudspeakers, both externally and internally, causing what were deemed to be unacceptable levels of disruption. Also, the budgetary costs of over £1million for the cabling infrastructure alone made a conventional solution financially prohibitive. By adopting a wireless system, not only were significant cost savings made but disruption to the site and its day-to-day operations were kept to a minimum, with an installation period of only 15 weeks.

Given the military significance of the site, the heightened threat from terrorism, along with other potential security breaches, were the focus of the system design. Conventional cabled systems rely on the integrity of the cable and its connections. By adopting a wireless approach, this concern was removed, but in its place came the potential vulnerability of the radio signal. Because

scanners purchased from any High Street electrical component retailer can be used to jam or interfere with the signals, radio is often used only as a back-up to conventional cabled systems. However, on the Portsmouth site, Sound Advice employed a totally secure digital radio technology designed by the military for battlefield communications. It transmits using a spread-spectrum, frequency-hopping signal in the 2.4 GHz band, changing randomly at up to 85 times a second to make jamming impossible. It is the only system to have passed the Joint Chiefs of Staff Anti Terrorism/Force Protection criteria in the USA and is the preferred system for US military bases worldwide. Under circumstances that may compromise a conventional system, the radio signal will seek another active unit and continue to broadcast.

Along with visitors to the Historic Dockyard, there can be thousands of military and civilian staff in the Naval Base at any one time. This innovative system has been designed to provide immediate, site-wide information for any major incidents and can be used in conjunction with other security measures such as CCTV and perimeter intrusion protection systems. IFP

For more information contact:
Bob Choppen
Product Manager,
Cooper Fulleon
Tel: +44 (0)1633 628500
Web:www.fulleon.co.uk

International Water Mist Conference 2008

17 & 18 September, 2008

Copenhagen, Denmark

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Registration

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Payment received on or before 27 June	Members **460 Euro**	Non-Members **520 Euro**
Payment received after 27 June	Members **520 Euro**	Non-Members **580 Euro**
On-Site Registration	Members **540 Euro**	Non-Members **600 Euro**

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Fax or mail this registration form to: **International Water Mist Association**, Biederitzer Str. 5, D-39175 Heyrothsberge, Germany,
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Cranford Controls – covering your every fire safety need

Due to an increasing amount of legislations put in place regarding fire safety, builders, architects, business and service providers all have a responsibility to make sure all persons within their premises are safe. Because of this they are constantly looking for the best possible fire safety equipment, many turn to Cranford Controls, with their up to date and constantly expanding product portfolio, for peace of mind.

Cranford Controls was established in 1993 and has grown from strength to strength to become a leading UK independent manufacturer of sounders, beacons and ancillary devices.

Their range is further expanded by their well established distribution agreements with manufacturers of complimentary products ensuring that Cranford Controls can cover your every fire safety need.

Recently developed and now available is Cranford's brand new VSO LED base sounder/beacon. This innovative product enables, through its specially designed lens, light to be diffused in all directions providing a full 360° light output, being the first one like it to the fire safety market.

As this product enables both a visual and audible indication of a fire it is compliant with the Disability Discrimination Act, which is of ever growing importance.

The product is available with a choice of clear, red, amber or blue lens with complimentary and custom LED's to ensure optimum light output, and in an option of 4 or 32 tone choices.

In-keeping with Cranford Controls' original VSO, their VSO LED is also engineered to fit all leading brands of smoke detectors and can be used with or without this; a lockable cover plate is also available when a detector is not in use. The VSO LED base sounder/beacon is also EN54-3 approved.

Cranford Controls is also listed as a preferred distributor of Fireco products, and have recently added the Dorgard (door retainer), Deafgard and System X to their distributed products range. All of these products are wireless, and work via acoustic

and radio signals, and all feature a fail safe mode. They are also compliant with the DDA.

The Deafgard is perfect for use in hotels, for example, where there is the possibility of deaf or hard of hearing people staying, who will need to be woken from their sleep in the case of a fire in an effective manner.

Door Retainers are an ideal preventative against the spread of fire and smoke, shutting the fire door upon the triggering of a fire alarm. The most popular types are electromagnetic and acoustic/radio controlled all of which Cranford Controls supply.

Cranford's well established and popular range is their flagship VTG sounders, VXB beacons and VTB sounder/beacons. These are all available with either a red or white body, and all beacons with a choice lens colour of clear, red, amber or blue, the same as all of their products with lenses. All are aesthetically pleasing.

For further information on any of our products or about what else is in our range please do not hesitate to contact one of our friendly sales team on +44 (0) 1420 592 444 and they will be happy to help. IFP

Alcohol Resistant F In Extremely Low T

Recent oil and gas discoveries have been found in the most inhospitable climates, where extremes of temperature are common, notably the Middle East where blackbody temperature can achieve +90°C and within the artic circles of –40°C and lower.

By Jan Knappert and Heinrich David

These extremely low temperatures have given fire fighters severe difficulties in Fire Fighting Foam Concentrate selection when dealing with fuels containing alcohols and polar solvents.

Originally Alcohol Resistant Foams were developed using Polysaccharide Polymer Additive to form a stable blanket between the fuel and foam blanket, this minimises vapourisation of the fuel and minimises the alcohol absorbing the water in the foam bubble wall and causing it to break down and become ineffective.

In low temperature environments these Polysaccharide containing foams become extremely viscous because of their chemical composition (they are also known as Thixotropic or Non-Newtonian Liquids) and are then difficult to pump, at temperatures below –15°C, they will start to solidify and will be rendered unusable.

Ongoing product development between MSR Dosiertechnik GmbH and Dr Sthamer – Hamburg, have developed not only a revolutionary low temperature foam for use at extremely low temperatures down to –25°C but also the means to proportion accurately at these extremely low temperatures.

FireDos is water driven foam proportioner, which does not require any external energy. Changing flow-rates, working pressures and viscosities of the dosing material have no influence of the admixing-rate.

The system consists mainly of a water motor and a piston pump. The foam concentrate is stocked in an atmospheric tank. The shaft of the water motor and the shaft of the piston pump are connected over a clutch. The whole water volume to the foam generators is passing the water motor. The number of rotations of the water motor are flow-proportional. The water motor is actuating a piston pump. The discharge volume of the piston pump is proportional to the number of rotation.

oam Proportioning emperatures

Any change of water flow changes without any delay the discharge volume of the piston pump, therefore the concentration remain constant.

The combination between water motor (positive displacement system) and piston pump (positive displacement system) create a accurate admixing rate, also in case of admixing rates of 1% or lower.

FireDos creates a pressure loss in the water system. The pressure loss is depending of the flow-rate, the working pressure and the admixing-rate. In case of a maximum flow-rate, a water pressure from around 10 bar and an admixing rate of 1% the pressure loss will be approx. 1 bar.

The system is able to admix all types of common fire fighting foam concentrates, also alcohol resistant foam concentrates and protein foams.

In combination with the right foam concentrate and foam generators low expansion, medium expansion and high expansion foams can be produced.

An excellent combination is ***FireDos*** and **Dr Sthamer – Hamburg Moussol APS LV 1x1** Alcohol resistant low viscosity foam concentrate with an admixing rate of 1%. Foam temperatures from minus 27°C and plus 25°C had no influences of the admixing rate. An ad-mixing rate 1.08% was achieved across the whole temperature range with different water flows and water pressures. Many installations have now been made with this combination of ad-mixer and foam concentrate.

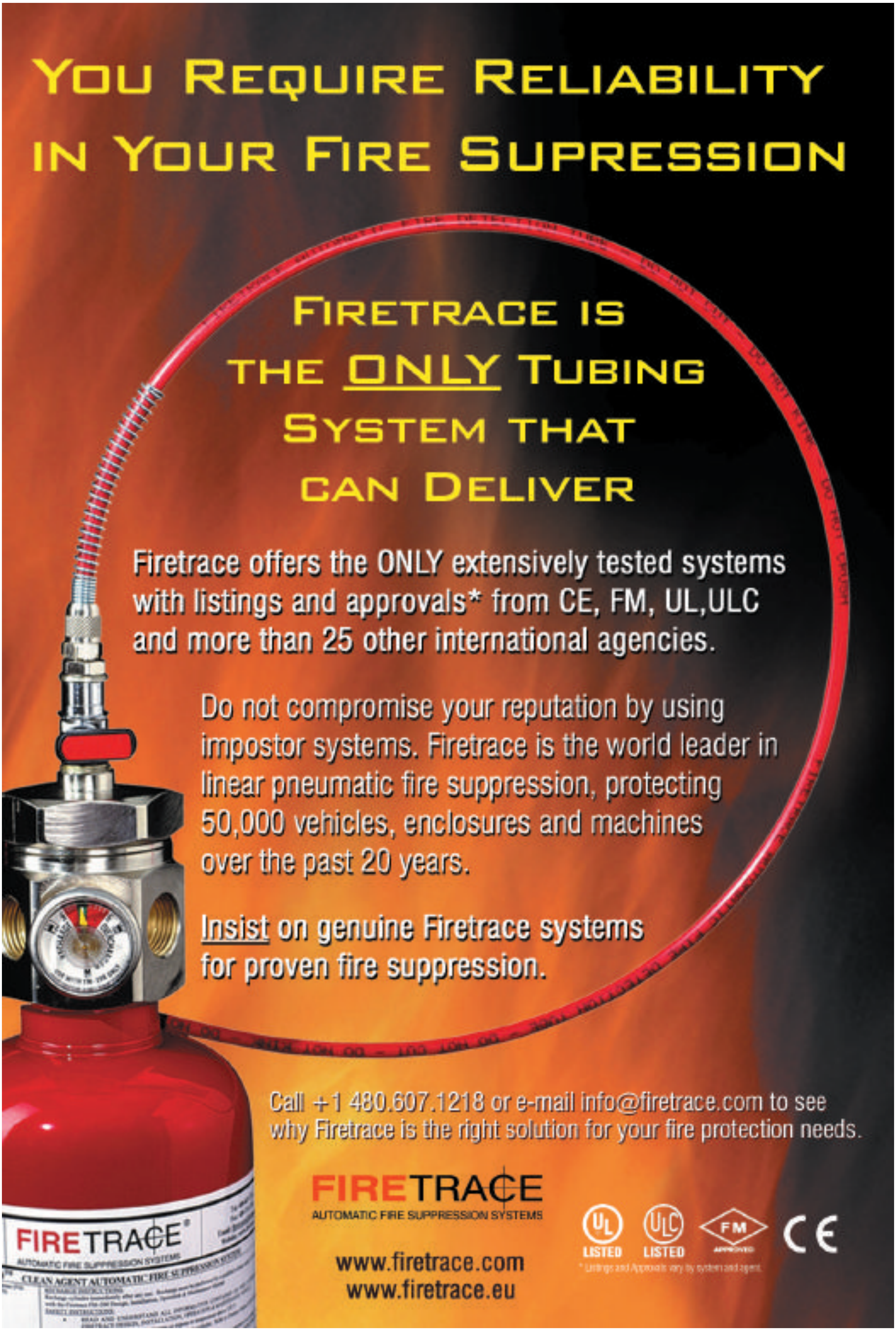
FireDos is a compact admixing system and can be used for any fire fighting application, like fixed installations, in fire trucks, on ships, off shore in mobile applications. The water can be fresh water, brackish water or sea water. The systems are in flow-rates from 10 l/min and 20,000 l/min, with fixed, in steps changing or simultaneously changing admixing-rates from 0,1% up to 10%, working pressures from 16 bar, 25 bar and 40 bar and working temperatures up to 50°C and 80°C available.

The biggest advantage of ***FireDos*** is, that the system can be tested under real conditions foam to water without producing any premix solution.

An other possibility is the remote injection of the foam concentrate. Between the system with foam tank and the injection point can be a distance up to 1,000 metres away.

With features like reducing of the minimum flow can the flow-range expanded up to 1:100.

FireDos has the VdS approval, the KFI (Korean Fire Institute), GL (Germanischer Lloyd, Marine approval), GOST-R approval (Russian Federation), approval from the Czech and Slovakian Republic. Applied for FM approval. The first batch of these units are in the FM laboratories for testing procedures. IFP



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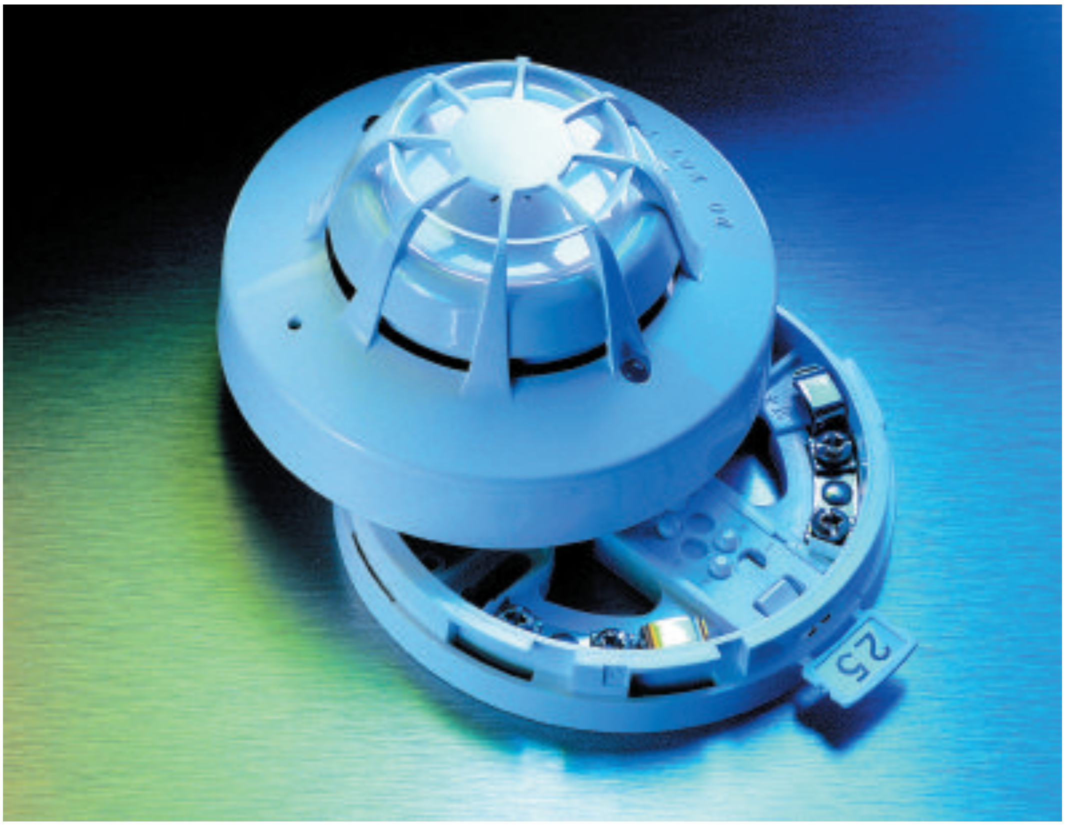


Fire Detection: The State of Play

By Tim Williams

President,
Apollo America

Tim Williams, President, Apollo America, looks at the latest developments in fire detection technology.

A more educated market, tighter regulations and a better understanding of the nature of fire has led to some significant developments in fire detection technology within the last few years. The market has moved from a relatively simple choice between conventional and analogue addressable fire detectors to a position of considerable sophistication in the types of detection methods and product designs on offer.

Identifying the correct type of fire detector for an application is largely a question of establishing what type of fire is likely to be encountered and what fire detection technology is available. There are some basic questions you need to ask in order to arrive at the best possible fire detection solution.

What do we want from a fire detector?

The objective is to save lives and protect property, so we want a fire detector to detect fires, to avoid unwanted alarms and to buy time for people to escape and for a fire-fighting response.

How does a fire detector work?

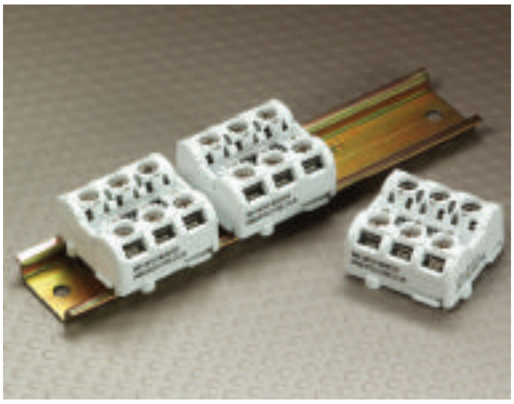
Fire detectors cannot detect a fire directly. They only detect the symptoms of a fire. 'General purpose' detectors need the combustion products – smoke particles, gas, heat or radiation – to travel to their sensors where they must be differentiated from similar effects not relating to a fire, such as cooking fumes, condensation or dust.

What type of fire is likely to be encountered?

Typically, a fire will start as a low energy fire – smouldering in some way – with the risk of developing into a high energy fire. Given the correct combination of fuel and air, the conflagration may quickly or instantly be a high energy fire. There are endless variables.

What technology is available?

When designing a fire protection system, it is important to understand and identify the characteristics and fuel material of a potential fire, the environment in which the detector will be sited and the risk of fire. For general use, smoke detectors are recommended since they give the highest level of protection – providing sufficient early warning to allow the evacuation of occupants. Smoke detection traditionally meant a choice between ionisation or optical sensor types, but



Mini Switch Monitor: The new Mini Switch Monitor measures just 39mm x 39mm x 20mm for projects where space is limited

issues over shipment and disposal of the small radioactive source in the former have largely ruled this technology out.

Optical smoke detectors are equipped with an infrared LED and detector arranged to measure light scattered by smoke particles. They are good for a wide range of smoke types symptomatic of early stages of fire i.e. slow-burning, smouldering fires that produce smoke with large particles. They are also insect immune and offer improved designs for airflow and drift compensation.

Heat detection uses thermistor sensors – a reliable and inexpensive technology that offers protection in areas such as kitchens, saunas and garages, where the environment has a high presence of airborne smoke or vapour particles. However, heat detectors only respond when a fire is well-established and generating a high heat output – offering no early warning of fire.

Another means of fire detection is the carbon monoxide (CO) detector. Using an electrochemical cell, the CO detector provides good early warning of deep-seated, smouldering fires and is unaffected by common sources of unwanted alarms such as steam, cooking or dust. However, CO detection should only be used as an adjunct to general purpose smoke detectors – never as a substitute.

Multisensors

For their sheer flexibility, multisensors, of which there are several types, are the best general-purpose detectors currently available. The most established type offer a combination of smoke and heat sensors, combining optical readings with temperature change to give a rapid response to the widest range of fire of any detector type, dramatically improving rejection of unwanted false alarms.

The dual optical detector is a more recent introduction. This type of device uses two internal LEDs which, it is claimed, can determine particle size, enabling the device to distinguish between steam and smoke because water vapour has larger particles than smoke from a fire.

While laboratory tests can be used to demonstrate this proposition, care must be taken. This type of device must not reject smoke as well as steam, or a genuine alarm will be suppressed with potentially serious consequences.

Both types of multisensor device are capable of operating in a number of different modes, often referred to as sensitivity settings. These different settings are provided to enable users to select the most appropriate operating mode for the local environment in which that device is sited – a mechanism for false alarm reduction. The sensitivity of the device can therefore be set depending on whether it is, say, in a hotel bedroom with an en suite shower or in a communal corridor in a house of multiple occupation.

Care should be taken to ensure that the multisensor has passed the approvals test in every operating mode. If the approval does not apply for some of the operating modes, it limits the choice of setting available. This could lead to the device being less effective than it could be, or to the device invalidating insurance cover if it is found to be programmed for a non-compliant setting in the event of a fire.

Multisensors can also provide an option for switching between multisensor mode and heat-only mode. This allows protection during fire verification and is also proving useful in university accommodation blocks or nurses' quarters where cooking can cause nuisance alarms. It has also been used successfully in theatres where special effects such as dry ice could cause false 'smoke' readings.

The National Indoor Arena has just installed multisensors to combat false alarms in the multiuse arena

WSCE See us on Booth 513
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5 modes
testing
testing
testing
testing
testing
approved

The purpose of a fire detector is to save lives and that's the top priority of Apollo's design engineers. **Good design means reliability of detection.**

But a good design means much more: it means the lowest possible incidence of false alarms caused by the detector. At Apollo, attention to the detail of mechanical and electronic design means detectors that have a reputation for reliability of alarm and very low false alarm incidence.

Take the Discovery range. It operates in one of five panel-selectable modes to suit the environment of installation. Algorithms process measured values to decide if an alarm should be raised. **Whatever the false alarm trigger—steam, cooking, smoking—Discovery will cope.**

How can we be so sure? Because Discovery is officially tested and approved in all five operating modes. Look it up on the internet.

Choose the mode to suit your fire risk and be sure that you are covered.

Officially tested and approved in all five operating modes.

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Web: www.apollo-fire.com

XPander is Apollo's wireless range that communicates with the XP95 loop by radio signals

Special circumstances

There are also fire detectors developed to combat application-specific risks. The optical beam detector is one example. It comprises an infrared transmitter and receiver so that a light beam can be sent and received across large voids such as warehouses, atria and theatres. If smoke obscures the beam, less light will be measured by the receiver and the alarm will be triggered.

Another application-specific example is the flame detector, designed to detect either the ultraviolet (UV) or infrared (IR) radiation emitted by a fire. Flame detectors are effective in protecting areas where open flames present a significant risk and can even detect gas fires, which are not visible to the naked eye.

Apollo has recently introduced a point Flame Detector to its XP95 range. It monitors for both UV and IR radiation and is marine approved. The device fits a standard XP95 base and is suited for use in vessel engine rooms, or situations where the use of a smoke detector is inappropriate.

Where explosion is a constant risk, in chemical processing or paint and solvent storage areas, for example, the use of intrinsically safe fire detectors is mandatory. Detectors for use in these areas need to be designed so they cannot ignite the explosive atmosphere either in normal or fault conditions. The nature of the hazard and the electrical apparatus requirements are governed by the ATEX directive.

What next?

Some 'standard' fire detection products are being refined to make them even more reliable, or adapted to meet specific requirements.

The introduction of wireless fire detection technology that uses radio transmission rather than hard wiring to communicate with the control panel is one example. XPander, Apollo's new wireless fire detection system (pictured above), includes smoke and heat detectors, call points and alarm devices. It can be used to expand an existing Apollo intelligent fire detection system to cover remote buildings without the cost and disruption of installing a hard wired extension to the fire system, or to protect heritage sites where minimal disruption to period features is a high priority.

Ancillary products are also being refined to make the installation of fire systems easier and quicker. A recent example is the Apollo Mini Switch Monitor (pictured page 18). Developed in response to customer feedback, the new device measures just 39mm x 39mm x 20mm and offers isolate, interrupt and non-interrupt functions in a single unit. The new Mini Switch Monitor replaces all existing models and can be DIN-Rail mounted or fitted into the backbox of a manual call point.

Final Summary

Fire detection products continue to be developed as new detection techniques and applications emerge. However, as sophisticated and reliable this new technology is, detectors still need to be correctly specified, positioned and checked regularly to ensure they keep pace with the fire detection requirements of building occupants. Appropriate application of the best technology, coupled with regular maintenance, is essential in ensuring that people and property are protected from the risks of fire. IFP


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University of Michigan MOJO Dormitory

Life Safety Issues Associated with Colleges and Universities

By Jeremy Mason & Peter Harrod, P.E.

RJA Group

Designing buildings in the college and university setting can be challenging for a multitude of reasons. Many institutions have rich traditions and standings in their respective communities.

With this nostalgia, often comes older buildings that are challenging to renovate while maintaining their historic fabric. Couple this with the fact that the way universities operate is ever changing these existing buildings often become increasingly more difficult to use as they age. Changes occur due to a myriad of factors such as new administrations, demands from significant donors, and probably most importantly demands of students. This article outlines how a masterplaning approach with a greater attention paid to code compliance implications can result in a more functional and cost effective project.

Determining the Applicable Codes

When a project begins, an important first step that must be taken is to determine the applicable codes. Too often however, enough due diligence is not performed to completely understand all of the applicable standards and how the authorities having jurisdiction (AHJ) interpret these codes. For example, many states retroactively adopt the existing building requirements of NFPA 101, *The Life Safety Code* (LSC), as a portion of their fire code. Although, these sections of the LSC may not be enforced until a building undergoes a renovation, alteration, or addition, the AHJ may have the authority to retroactively mandate compliance regardless of proposed work.

Most states also adopt the International Building Code (IBC) as the basis for their building code which may reference the International Existing Building Code (IEBC) to address existing buildings undergoing renovations, alterations, and additions. It is important to understand if the particular

MIT Brain and Coginitive Sciences Center

jurisdiction in question also still adopts Chapter 34, Existing Buildings, of the IBC and/or the IEBC. Jurisdictions may adopt both Chapter 34 and the IEBC and give the owner a choice of which code to use. It is in the best interest of the college or university to analyze both codes to understand how each one effects their building in question and which code is more suitable.

Masterplanning and Challenges

Most universities have a masterplan that clearly defines how existing and new buildings will be used over the coming years and even decades. Though, it is generally understood that when a building undergoes substantial renovation, alterations, and even an addition that the building, fire, and accessibility codes take this opportunity to improve the overall safety of said building. Often times, however, when the masterplan is being created, not enough attention is given to the fire protection, life safety, and accessibility implications associated with partial renovation and reuse. Not accounting for the addition or upgrades of these features can add considerable cost to the overall masterplan

Another issue that is sometimes overlooked during the masterplaning phase involves proximity of buildings to one another. For example, a recent architectural trend includes physically connecting existing building(s) with new building(s) to bridge the new innovative campus with the rich historic tradition of the institute. Alternatively, site constraints sometimes dictate new construction be located within close proximity of existing non-conforming buildings When buildings are located close to one another, a litany of issues often arises. For example, when buildings are considered separate and distinct, an assumed lot line must be drawn between the two buildings such that the buildings do not expose each other to fire. The lot line must be strategically located so as not to render the openings and wall of the existing building non-compliant. What often becomes an issue is that the assumed lot line is located closer to the new building than the college would desire, which limits the amount of windows permitted in the new building.

Another building proximity issue occurs when buildings connect to one another. This becomes less of an issue if the existing construction classification affords the new building to simply be a part of the new building. However, buildings that are significantly old were often constructed far differently than today's buildings and often constructed

Most universities have a masterplan that clearly defines how existing and new buildings will be used over the coming years and even decades

to primitive or no codes at all. For example, what looks to be a solid masonry building from the exterior may have concealed wood framing. The masterplan may call for a new five story Assembly building that is seamlessly connected to the existing building. In this case, the existing construction type may simply not allow the new building to be considered an addition and thus be seamlessly connected. Several impractical code compliant solutions include creating separate buildings with rated walls and limited openings or tearing out the wood floors in the existing building to upgrade

the construction type. It is often possible to justify code compliant alternatives that solve this particular issue without taking the drastic measures specified above. One solution that has been implemented involves the creation of an atrium between the two buildings that also acts as a pedestrian bridge. Fire resistant rated separations are permitted to be glass with closely located sprinklers that allows the two buildings to feel like a single building that ultimately was what the university was looking for.

Campus planners should consider retaining a fire protection engineer (FPE) in the initial masterplan so major hurdles become evident and alternatives can be considered. The FPE would be responsible for performing an initial review of the existing buildings and reviewing the masterplan to flush out major issues, especially those that have significant economic consequences. This can enable the stakeholders to be able to convey an accurate assessment of the situation to the campus planner who ultimately accept the masterplan. This can enable those responsible for the masterplan to look smart and informed!

Accessibility

Another area of a masterplan that is often overlooked is accessibility. Accessibility is a prominent and challenging issue facing universities today as it is more than ever in the public eye. College and universities are often constructed in topographically challenging areas that include hills or within city constraints that make the traverse. Where the land does not feasibly allow traveling on an accessible ramp or level surface, unique solutions have to be developed. This may include using a building's new elevator as an accessible route in travelling through campus.

Other accessibility issues arise during the adaptive reuse of buildings. Generally, the accessibility codes require that a portion of the money that is spent on a project be allocated to accessibility upgrades, in the hope of improving the general accessibility of the building. For example, the American Disability Act Accessibility Guidelines (ADAAG) requires that up to 20% of the project costs be spent to make a building accessible. If the building is largely accessible, then the owner may not need to spend 20% of the project cost to make the rest of the areas accessible. On the other hand, where a building is not accessible at all, ADAAG would only require 20% of the money be spent on accessibility upgrades.

Assuming a building is initially not accessible, money should be spent to provide an accessible entrance, accessible routes within the building including a vertical accessible route to the primary function areas of the building, and at least one accessible bathroom. If the applicable accessibility code(s) still require that additional monies be spent, many other accessible items can be upgraded including signage, handrails, etc. Monies should also be spent to improve the primary use of the building. For example, if a building is a classroom facility, classrooms should be upgraded to be accessible which may include dispersed accessible wheelchair and companion seats and an accessible route to lecture or performance areas. It should be noted that spending more than 20% of the project cost may be viewed as excessively onerous to the owner which could prohibit the project from moving forward. Thus ADAAG only requires that up to 20% of the project be spent on accessibility upgrades.

Campus planners should consider retaining a fire protection engineer (FPE) in the initial masterplan so major hurdles become evident and alternatives can be considered

Fire Protection and Fire Alarm

Many colleges and universities have undertaken initiatives to improve the fire protection and life safety of their buildings. This generally starts with installing or improving the fire alarm and the sprinkler systems. Often times there are challenges associated with installing these systems into buildings.

Norwich University Campus Center

Case Western Residential Village

Although colleges and universities would certainly like to improve the life safety of their buildings, there is a substantial cost and often a disruption associated with providing these systems. Not only are staff and/or residents often disrupted by the installation of new fire protection systems, but configuring these systems in an architecturally seamless yet cost-effective manner can be challenging. Considering these hurdles, it is often possible to negotiate with building and fire officials on behalf of the university to come up with unique and creative solutions.

An example that outlines challenges associated with installing sprinkler and fire alarm systems is when a portion of an existing building is planned to be renovated over the summer break. The portions of the building that are planned to be renovated are not separated with fire rated construction from the spaces that are not going to be renovated. Based on the percentage of spaces that are being renovated, the building code would require that either the entire building be sprinklered and provided with a new fire alarm system or that all of the renovated areas be sprinklered and provided with a fire alarm system and be separated from the non-renovated spaces. The requirement to provide systems throughout the building or install rated separations is often excessively onerous to the university. In lieu of providing systems through out the building, it may be possible to develop solutions that are acceptable to both the AHJ and the university. Examples of these solutions include phasing the installation of new systems with a firm commitment by the university, adding standpipes that allow increased fire fighting capabilities, improving means of egress to allow occupants to egress the building quicker, and limiting the combustibles in the building. Generally these innovative solutions require discussions and ultimately the blessing of the AHJ and are often much more amenable to the university or college

Although colleges and universities would certainly like to improve the life safety of their buildings, there is a substantial cost and often a disruption associated with providing these systems

Egress

Existing buildings often contain challenges including exits that are undersized, not remote from one another, and not enclosed in sufficiently rated construction. Adding or reconstructing exits can be a painful and expensive exercise that can also dramatically alter the architecture around the exits. It is often necessary to engineer unique approaches that solve these problems. Such approaches may include performing a timed egress analysis that shows occupants can safely exit the building in what is considered a safe amount of time. Other approaches may entail adding increased levels of safety to the building that more quickly notify occupants (i.e. smoke detection even though it may not be required in a fully sprinklered building) or ensuring a safer path of travel to exit stairs by creating rated corridors.

Summary and Conclusion

As evident throughout this article, there are many daunting fire protection, life safety, and accessibility challenges that colleges and universities face when deciding it is time to renovate their buildings. With some strategic feedback from the project team during the initial planning process, the college or university can avoid many pitfalls and give a clear picture of what is actually going to be required in the near future. Once the design process begins, then creative and alternative approaches may be implemented to allow the building to be reused to the satisfaction of both the owner and the local authority having jurisdiction. The fire protection engineer should certainly be in integral part of this process to ensure a safe and cost-effective building is designed. IFP

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Clifford & Snell's Strategic Expansion into the USA

(L to R) Trevor Gage, Director & General Manager, Clifford & Snell with Phil Hausman, Business Development Manager, The Americas

UK-based, leading manufacturer of Audible and Visual Alarm products, CLIFFORD & SNELL has announced its intention to strategically expand its business in the US.

The company's products are renowned for their innovative design and high performance for applications which range from general signalling including Hazardous Areas to process control, industrial and marine.

Trevor Gage, Director and General Manager, Clifford & Snell, believes that the success that the company has achieved in key markets such as the Far East, Middle East and Scandinavia can also be attained in the USA.

"I am delighted to announce the appointment of Phil Hausman as Business Development Manager for the Americas. Hausman has established a Clifford and Snell sales office and warehouse in Houston which will act as a US base and provide the conduit for growth in sales and service with existing customers whilst offering new customers the opportunity of accessing our extensive product range with US-based support," said Gage.

Phil Hausman comes to Clifford & Snell with an extensive knowledge of the oil/gas and petrochemical markets and has particular experience in the areas of offshore and industrial applications. According to Gage, Hausman brings considerable technical expertise and a wealth of knowledge within US markets which will assist Clifford & Snell to provide an exceptional level of service and commitment to customers throughout the Americas.

For further details, contact:
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Website: www.cliffordandsnell.net

Cooper Fulleon introduces Voice+ technology to the Symphoni

COOPER FULLEON's flexible and adaptable Voice+ technology is being released in the low current Symphoni sounder and the Symphoni AV sounder beacon for DDA applications.

The technology endows the sounders with much greater message on-board storage while doing away with the EPROMS previously used. With up to eight user selectable tones and 16 messages the sounders can be configured so that users and stockists can have a single unit pre-programmed with their most frequently used tones and messages.

A further benefit is that the sounders can be reprogrammed for specific applications using a suitably equipped PC and security interface. The interface ensures only authorised personnel can connect to the sounder for reconfiguration.

Programming sounders will be familiar to anyone who uses a portable music player, with the ability to select individual messages or create playlists for down loading to the sounders.

Further details: Danielle Sharp,
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VTG 24 Volt 32-Tone Spatial Sounder

Approved to EN54-Part 3 by the LPCB and VdS on tones 1, 8, 11, 25 and 27, Cranford Controls' UK manufactured VTG 24 Volt 32-Tone Spatial Sounder is in high demand. The product's aesthetically pleasing appearance is also highly popular with its unique nose-cone design enabling a strong and full sound output.

The VTG is available with a red or white body and a deep or shallow base; the various tones include the well recognised Cranford sweep and various universal tones, including Dutch sweep tone, German DIN tone and French tone AFNOR, making it ideal for world-wide distribution.

The VTG is CE marked and, as with all Cranford products, it is also RoHS and Weee compliant. The products low current consumption is also desirable.

The DIL switch, located on the VTG's PCB board, allows the user to select between three varying volume settings, low, medium or high, with the high setting being recommendable for facilities where additional sound output may be required.

The VTG also utilises a universal locking system via an industry standard locking system, thus providing an aid in protection against vandalism, and making the VTG also fully compliant with the latest requirements of British and European standards.

Further more there are other varying products within the VTG range that compliment one another, including the VXB Beacon and the VTB Sounder/ Beacon all of which are manufactured and distributed to the same high degree Cranford Controls works to.

For further details, contact:

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Spectra beacons cover all the bases

E2S, Europe's leading manufacturer of warning sounders and beacons, has developed the Spectra beacon family to extend its industrial range of audible and visual signalling devices. Available in three sizes, six lens colours and a choice of static, flashing filament, Xenon strobe, rotating or LED versions, Spectra offers a solution for all situations including safety warning, status indication and fire alarm.

The LED option gives longer operational life and lower life costs than a traditional filament lamp, particularly important for continuous use or where access or maintenance is difficult. The low voltage DC LED version has a choice of nine user-selectable modes giving continuous, flashing, rotating, double strike and alternate side flash modes; up to three stages of alarm can be selected through the appropriate wiring connections. The B300 has a dual frequency option where a flash rate of 1Hz or 2Hz can be selected remotely through the wiring configuration to provide two stages of warning. The Xenon strobe B300 and B400 models are optionally available in synchronised versions, so that all devices on the same power supply circuit flash in unison, a particular benefit in fire alarm applications.

Primarily intended for surface mounting, pole and wall mounting options are available to make installation neat and easy. All units have a choice of cable entries for ease of wiring. Manufactured from UV stabilised polycarbonate, Spectra beacons will not fade when exposed to direct sunlight and are protected to IP65, making them suitable for outdoor applications.

For further information contact:

E2S
Peter Fay, Managing Director, European Safety Systems Limited
Impress House, Mansell Road, London W3 7QH
Tel: + 44 (0)20 8743 8880 Fax: + 44 (0)20 8740 4200
Email: sales@e2s.com Website: www.e2s.com

Fire Alarm Encourages Quick Response

The Nexus Voice Sounder from KLAXON SIGNALS is a fire alarm that combines normal sounder signals with a clear, synchronised voice message to provide authoritative instruction that eliminates confusion after an alarm sounds.

Units are available with 4 pre-programmed messages, selected from a message library that covers an extensive range of applications, and bespoke messages are also available on request. The unique horn design feature ensures superior message quality over other voice sounders available in the market.

Combined with an interface control unit, the Nexus voice sounders can transmit up to four messages over two wires – making them suitable for fire alarm systems. A USB interface allows special messages in WAV format to be downloaded onto the sounder from any PC, providing users with the flexibility of adding and removing messages in-house.

They have a high 110 dB output, are weatherproofed to IP66 and can be installed in almost any location. A choice of sound outputs means there is a model to overcome most levels of background noise.

Either xenon or high efficiency LED beacons can be added to the Nexus sounder. The combination of a clear voice message, powerful sounder and high output beacon ensures a highly effective warning tool.

Klaxon Signals Limited is one of the world's leading manufacturers and suppliers of sound and vision signalling equipment for fire and life safety, industrial and security applications. Part of Halma p.l.c., Klaxon offers an extensive range of fire alarm sirens, electronic sounders, buzzers, beacons and bells, in addition to innovative evacuation technology and software.

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Fire-Cryer® Voice Sounders

FIRE-CRYER® voice message sounders provide simple, cost-effective fully synchronised voice annunciation for all forms of evacuation and information broadcast. They require no special wiring and can be retrofitted to existing installations. The units can be fully synchronised and have a low current consumption allowing simple replacement of existing sounders and bells.

Fire-Cryer® products comprise the broadest range of voice sounders currently available, from the Mini Fire-Cryer® designed for discreet mounting under fire detector heads to the powerful Midi & Maxi Fire-Cryers® for open spaces, warehouses and industrial sites.

All Fire-Cryers® can broadcast 4 user-selectable messages chosen from a library of hundreds. Foreign language and bespoke messages are also available. Fire-Cryer® voice sounders can be both heard and understood.

The five Fire-Cryer® voice sounder models in the range meet every requirement from residential and light commercial to heavy industrial applications.

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Using Wireless Toxic Gas Monitors for Confined Space Entry During Plant Turnarounds

By Bob Durstenfield

When power plants, oil refineries, food processing, pharmaceutical, chemical, paint or plastic plants need to have major service, be upgraded or retrofitted this is called a plant turnaround. These times of zero production are both high stress and high cost both in terms of labor and lost production revenue.

The positive side can be substantial: an increase in equipment reliability, and a lower risk that broken equipment will cause an unscheduled outage or catastrophic accident. Many times repairs need to be made in the "confined spaces" of pressure vessels, separators, feeders, storage tanks and valve systems. These limited access, limited ventilation confined spaces present a challenge to both worker safety and retrofit time. A "confined space" as defined by OSHA, has limited or restricted means of entry, exit or ventilation, is large enough for a person to enter and perform work, and is not designed for continuous occupancy.

Confined space entry is inherently dangerous, and in the high intensity environment of a plant turnaround, it becomes especially challenging to manage worker safety against the need for efficiency and the economic pressures of getting the plant back on line as quickly as possible. Employees who work in confined spaces can be seriously injured or killed by entrapment, engulfment, or the hazardous atmospheric conditions found in these spaces. The atmosphere in a confined space can become hazardous for a variety of reasons. Welding operations can produce toxic fumes, and decomposing organic material can release chemicals such as hydrogen sulfide or methane. Heavier than air gases like carbon dioxide can sink to the bottom of a confined space and reduce the level of oxygen to fatal levels. Oxygen can also be consumed by many chemical processes such as the formation of rust or bacterial action in the fermentation process. There may also be residual chemicals from the production processes that can include volatile organic compounds (VOCs), or hydrocarbons, which are both toxic and flammable and potentially an explosion hazard.

All of this work falls under the guidelines of confined space entry found in United State Occupational Safety and Health Administration (OSHA) regulation 1910. This regulation was originally written for sewer entry where the decomposition of biological material produced expected hazardous threats including oxygen depletion, accumulated methane gas, carbon monoxide and hydrogen sulfide. Those threats have traditionally been handled by a four-gas confined space entry monitor. When working in the industrial environment the hazardous threats change based on the processes and chemicals in use. The OSHA regulation was revised with the addition of subpart 146 Appendix E which states:

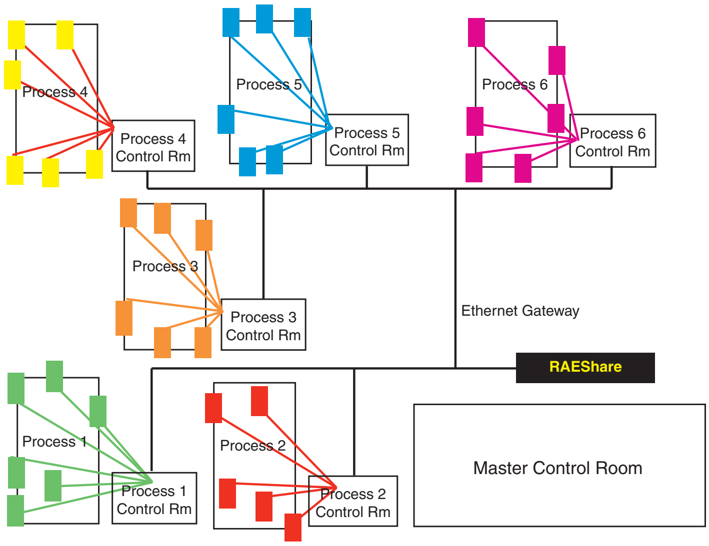
> "…where the employer has not been able to identify the specific atmospheric hazards present or potentially present in the workspace, broad range sensors are preferable because they indicate that the hazardous threshold of a class (or classes) of contaminants (i.e. hydrocarbons) in the work environment have been exceeded."

In OSHA 1910 Subpart Z, more than 80% of the gases and vapors listed as "Toxic and Hazardous Substances" are volatile organic compounds (VOCs) or hydrocarbons. And most are toxic long before they are combustible, they also go unobserved by the standard four-Gas monitor.

The presence of VOCs immediately calls for the use of either a dedicated photoionization detector or a multi-gas monitor that includes a PID. In the last several years 5-gas monitors have been available in both handheld and wireless configurations.

As a turnaround work-shift begins each of the confined spaces on the facility would need to be monitored prior to entry for the time specified by the resident industrial hygienist. OSHA requires that confined space entry permits be reissued every twelve hours or when a new shift starts. This has traditionally been a manual process, and it takes several hours to revisit the work sites, resample the environment, and then reissue the permit. Hours of downtime during each shift of a plant turnaround can cost companies thousands of dollars. After each work break the confined space in question would again have to

Employees who work in confined spaces can be seriously injured or killed by entrapment, engulfment, or the hazardous atmospheric conditions found in these spaces.



be monitored before work could resume. In addition to the work crew a "spotter" would be assigned to each hole or worksite. This person would be responsible for making sure that the working atmosphere of the work site did not pose a safety threat. Typically the spotter would be issued a hand held monitor that might include a drop line of extended tubing to actually sample the work area. If there was a problem it was the spotter's job to clear the worksite, begin ventilation and then eventually give the approval to return to work. This presented two problems, the spotter had to know how to interpret the alarm and had to get help if workers were endangered. Often, the spotter became tired or distracted and could make mistakes in judgment when reading alarms on monitoring equipment.

Initially, site safety officers began deploying wireless monitor as a back up to the fixed-gas systems that were turned off during the service cycle. They soon realized that they could also provide a back up to the spotter, and even continuously watch the hole when the spotter was not there. The advent of wireless gas detection has given facility operators and safety officers a new approach to this solve "hole watch" problem.

Using wireless gas detection networks with sensors at each confined space worksite and a central command center, safety officers could continuously monitor a work site, even when workers where not present. Procedures were developed so that if a work site had not alarmed during the break, then is could be assumed that it was safe to re-enter the work site immediately. This cut the wait time after each break and provided a cost effective way to safely increase productivity.

One of the early adopters of wireless gas diction has been the Valero oil refinery in Delaware. This facility brings down each of six major areas for 60 days at a time. Significant time is saved by not having to recertify confined spaces for each work shift. This is done by using the wireless gas monitors to continuously monitor and only requiring recertification if there has been an alarm.

The Wireless Monitor Deployment

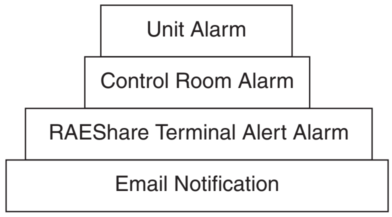
The facility has six independent wireless networks that are linked to a local control rooms. Data from each of the six control rooms is uploaded to an offsite data server that integrates all of the site data. The master control room monitors all six production areas through the web-based terminal viewer. The viewer provides visibility to all 36 deployed wireless monitors as well as real-time maps showing the location and alarm data for all units. This facility deployment currently includes:

1 a coker system with 5 currently deployed monitors
2 a crude unit
3 a desulferizer
4 an FCCU DGA with 10 currently deployed monitors
5 a hydrocracker
6 a sulfur plant with 7 currently deployed monitors

Alarms

Alarm notification is handled in three layers:

1 Individual monitors provide local alarm notification at the work site
2 The local control room is notified of an alarm over the wireless network and is displayed on the remote base station so that a response can be initiated if necessary.
3 Each local control room uploads the real time data over hardwire Ethernet cable onto the secure offsite data server.
4 Data is monitored real-time on secure web terminal in the Master control room.
5 As a back up – Email alerts are issued whenever any wireless monitor on site goes into alarm.



One of the other advantages of the wireless gas monitoring system has been that all of the data for all of the worksites is immediately stored on a computer for both future reference and as part of the legal safety record for the site. This has given OSHA inspectors instant access to the exposure data for each work site.

The use of wireless toxic gas monitors has come of age. Today's monitors are quick to deploy or reconfigure and offer the ability to use global positioning satellite technology to know exactly where and alarm is coming from. Wireless gas monitors have been found to provide both a better worker safety net and significant cost savings to industrial facilities that must continually improve their production and manage their costs. IFP

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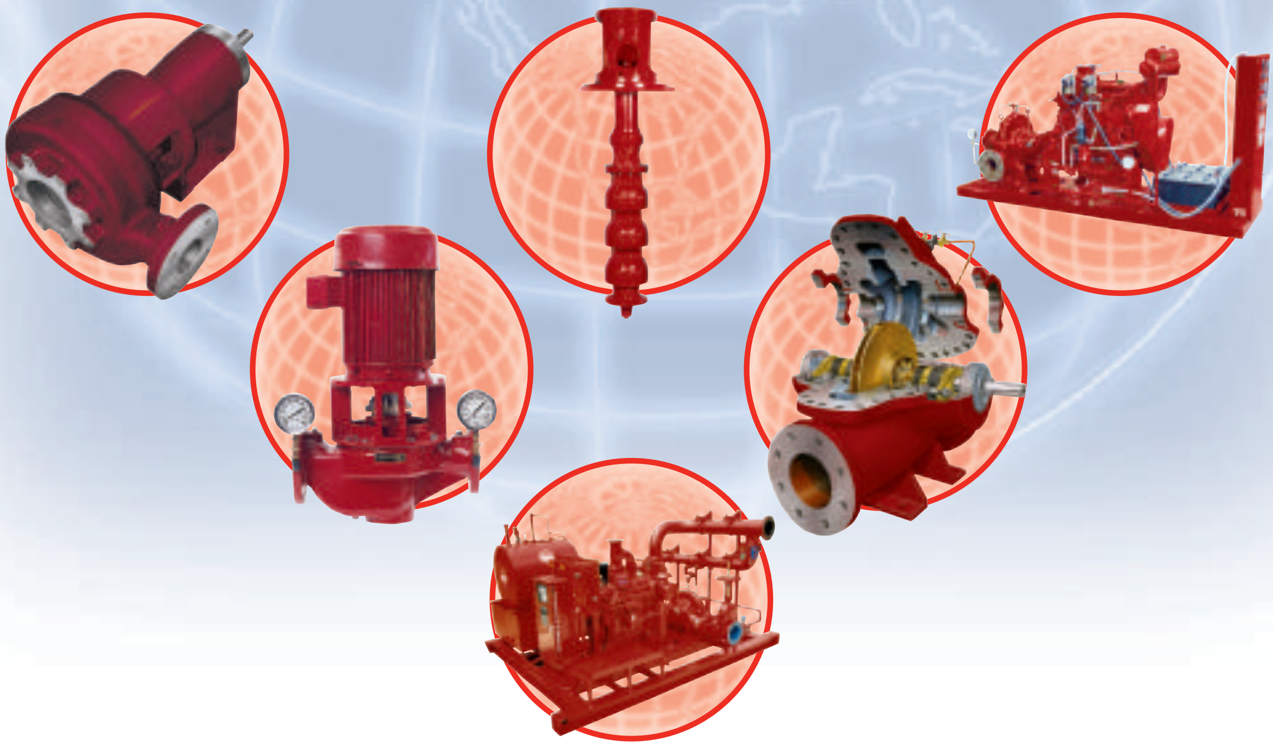
Bob Durstenfeld has spent more than five years at RAE Systems as Director of Public Relations and Investor Relations. Before joining RAE Systems, Durstenfeld served as Senior Account Manager and Staff Technologist for the Silicon Valley office of Fleishman-Hillard Public Relations. Bob has also held management positions at Agilent Technologies and Hewlett-Packard Company. He has published articles on Port Security and Wireless Gas Detection.

Mr. Durstenfeld received his Masters in Engineering Management and International Marketing from Santa Clara University and his BS in Engineering and Biology from UCLA.

Patterson Fire Pumps What the Industry Relies on These Days



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Advanced Fire System Communications

The application of communication technologies to fire systems is becoming increasingly important. Ray Hope, Managing Director of Advanced Electronics describes how the use of communications is bringing major benefits to both the installer and the end-user.

By Ray Hope

Managing Director, Advanced Electronics

There are two areas in which advanced communication technologies are having an impact on fire systems, remote communications over the Internet and fire panel networking.

Remote Communications over the Internet

In the late 1970s a standardized communications protocol was developed that would change worldwide communications forever. This standardized Transmission Control Protocol/Internet Protocol, commonly abbreviated to 'TCP/IP' or simply 'IP', enabled the inter-connection of computer networks on a global scale. Now, 30 years on, TCP/IP is a fully established communication protocol and is used for communication on the World Wide Web (Internet). However, TCP/IP is not exclusively for use with computers and provided certain rules are followed it is possible to connect virtually any device on to a TCP/IP network, including the control equipment and associated peripheral devices of a fire network.

Nearly every commercial building has a computer network already installed. For a device to communicate over this network, it simply needs to support the TCP/IP protocol and be connected to a spare network port. Therefore, suitably enabled fire detection equipment can communicate over this network without the need to install any additional communication cabling.

Once the device is connected to the network it has to be identified so other devices can communicate with it. This is achieved with the IP address. The IP address is unique to each device on the network and allows messages to be sent to, and received from the device from anywhere on the network. In fact it is possible to communicate with the device from anywhere within a building or even multiple buildings, provided those buildings have a common TCP/IP network.

Can IP Networks Replace Dedicated Fire Panel Networks?

Inter-connecting fire panels over an existing computer network lends itself to many, potentially hazardous, problems. First and foremost computer networks are generally wired using non fire-resistant cable. If there is a fire, the cable connecting the

fire panels could be damaged rendering the network useless.

Secondly, the fire system would be sharing the network with other non-fire devices such as computers, printers and other IT equipment. The fire system has no control over these other devices and therefore cannot guarantee how they might interact or how network performance might be impaired during a critical fire situation.

However, this doesn't mean that there is not a place for TCP/IP in fire systems. Just because fire panels are not linked together on a TCP/IP network doesn't make TCP/IP superfluous. TCP/IP solutions can be seen as secondary enhancements to the primary function of the dedicated fire panel network.

Using TCP/IP as a Gateway into the Fire Network

ipGateway

Creating devices which can communicate and interact with an existing dedicated fire network opens up innovative possibilities, as is demonstrated by the new ipGateway™ product from Advanced Electronics.

ipGateway™ is a fully interactive internet portal for the *Mx-4000* range of fire alarm control panels, which allows remote monitoring of any *Mx-4000* series fire system, both stand alone and networked, from anywhere on the internet using a standard web browser. A distinct advantage is gained from the use of a web browser to view the information as it eliminates the need for any proprietary software to be installed on each PC that uses ipGateway™.

When accessing ipGateway™ the user is presented with comprehensive information about the fire system. This includes a breakdown of all the zones, a detailed description and current status of all devices contained within each zone and an overall indication of the current status of the system. The information displayed on the user's web browser is updated in real time, ensuring that any change to the status of the system is clearly identified and reported to the user as it happens.

In addition to the visual representation, ipGateway™ allows the user to interact with the fire system as though they were stood in front of a fire panel. From a remote location anywhere in the world a user, with the correct authority and access rights, can enable/disable zones, enable/disable devices, reset networks, reset, mute, silence or resound sounders on a panel or a network. When connecting the system to the Internet a higher level of security is needed to counter threats such as viruses and unscrupulous access. The built-in security features of ipGateway™ require anauthorized user to logon using a password and to connect to the remote system via a secure IP address.

ipGateway™ can also be configured to use an existing email server to send a notification as a result of an event on the fire system. Each event can be setup to alert a number of different personnel at varying times of the day. This is useful for environments where a number of people are responsible for the fire system, but those people work various shifts throughout the day. These e-mail addresses are simple to set-up in the web browser without the need to configure local e-mail clients.

It should be noted at this point that the ipGateway™ is not intended as a replacement for an existing fire system control and indication

interface, instead it should be seen as a secondary enhancement by providing a set of tools and functions to compliment the everyday operation and maintenance of a fire system.

The remote interrogation of the fire system opens up possibilities for maintenance companies to identify problems before they actually happen, saving time and money by reducing unnecessary journeys to site. The fire system can also be configured to send maintenance and status information as a text message or e-mail.

By enhancing the built in functionality of a fire system with a TCP/IP gateway, both their visibility and reach can be significantly enhanced and extended.

Hi-Speed Fault Tolerant Networks for Fire Systems

It is already common practice to connect fire alarm control panels and peripherals, often located in physically different locations, over a proprietary network. However, the design and performance of the network can have a significant effect on the overall operation of the system.

Advanced Electronics *Ad-NeT+* fire network can be configured to allow the inter-connection of up to 200 panels (nodes) in a fault tolerant configuration. The maximum cable length between nodes is 1.5km, with a total loop length of 20km. The network is capable of withstanding a single fault between nodes without loss of communications to any single panel. This is all achieved using standard two-core fire resistant cable.

Indication and response times from Control and Indicating Equipment (CIE) are set-out in the EN standards and EN 54-13:2005 (E) 4.3.2.1 states that ***"a fire alarm condition on a CIE shall be indicated on the main CIE within 20sec."*** The typical delay on an *Ad-NeT+* 50 panel network for each panel to indicate a fire from any zone is less than one second and 3.5 seconds for a full 200 panel system.

The network operates as a true peer-to-peer system allowing information from any input or output device to be passed over the network and displayed on any control panel or remote terminal as required. Details include Fire, General Alarm, Pre-alarm, Fault, Control Inputs and Disablement as well as analogue values, test instructions and status information. The *Ad-NeT+* systems *DynamiX* zoning facility allows the networked system to utilize up to 1000 zones providing non-confusing indication and allowing true peer-to-peer cross panel report, control and site-wide cause and effect functionality. No single panel is required to act as a 'Master' for the network to operate. IFP

Cradle to Grave Responsibility for Clean Agents

The regulatory requirements for the management of halocarbon emissions have continued to increase since first introduced in 1974 with the publication of the Molina-Rowland report. This report started a process that eventually culminated in the signing of the Montreal Protocol in 1987.

By Ron Marcus

Remtec International

Ten years later, the Kyoto Protocol was adopted on 11 December 1997 at the third Conference of the Parties to the UNFCCC (COP 3) in Kyoto, Japan and went into effect on 16 February 2005.

The Protocol's major feature is that it has mandatory targets on greenhouse-gas emissions for the world's leading economies, which have accepted it. These targets range from –8 per cent to +10 per cent of the countries' individual 1990 emissions levels "with a view to reducing their overall emissions of such gases by at least 5 per cent below existing 1990 levels in the commitment period 2008 to 2012." In almost all cases – even those set at +10 percent of 1990 levels – the limits call for significant reductions in currently projected emissions.

The goal is to lower overall emissions of six greenhouse gases – carbon dioxide, methane, nitrous oxide, sulfur hexafluoride, hydrofluorocarbons, and perfluorocarbons – averaged over the period of 2008-2012.

These commitments have not been without difficulty and continue to evolve.

Most importantly, as regulations continue to evolve, manufacturers, distributors, installers and end users face increasing exposure and penalties when these materials are mishandled from cradle to grave.

This responsibility may even extend beyond the

normal chain of custody to lenders and investors. Schnapf Environmental Report, a newsletter covering environmental developments and case law reported in 2003, "With over 160 countries now committed to following the Kyoto Protocol and many countries adopting legal mechanisms to implement the goals of the treaty, it is increasingly important for purchasers and lenders of certain industrial sectors to evaluate potential climate change impacts on businesses during due diligence. Moreover, corporate directors and officers could possibly face liability under the "Business Judgment Rule" if they can be shown to have failed to exercise due care by disregarding information about the potential adverse financial consequences or reputational risk of climate change on their business. Indeed, some in the insurance industry believe they are already feeling the impacts of climate change as a result of weather-related losses. Administrators of institutional investment funds may also feel that they have a fiduciary duty to determine the impacts of climate change and seek changes in corporate strategies towards their GHG emissions."

As the responsibility for management of these materials continues to grow, the protocol for their handling for re-use or destruction becomes an increasingly important aspect of any project proposal.

RemTec International specializes in accepting Halons as well as a broad range of ODS and GHGs from international sources for reclamation and destruction.

Our protocol for shipping material for either option into the United States, calls for complete traceable and verifiable records not only for purposes of obtaining an export permit from the source country and a US Environmental Protection Agency, (EPA) for entry into the United States, but also as a means of validating each step of the process.

In almost all cases – even those set at +10 percent of 1990 levels – the limits call for significant reductions in currently projected emissions.

Reclamation is the first option for consideration

Reclamation is an option for Halon 1301. In accordance with the Regulation (EC) No 2037/2000 of the European Parliament and of the Council of 29 June 2000 on substances that deplete the ozone layer, Halon 1301 can be employed in critical uses such as the following.

- in aircraft for the protection of crew compartments, engine nacelles, cargo bays and dry bays,
- in military land vehicles and naval vessels for the protection of spaces occupied by personnel and engine compartments,
- for the making inert of occupied spaces where flammable liquid and/or gas release could occur in the military and oil, gas and petrochemical sector, and in existing cargo ships,
- for the making inert of existing manned communication and command centres of the armed forces or others, essential for national security,
- for the making inert of spaces where there may be a risk of dispersion of radioactive matter,
- in the Channel Tunnel and associated installations and rolling stock.

Permitting

The export permit must be obtained in compliance with the source country's Ministry of Environment regulations. The procedure starts with an inventory of the cylinders to be offered for destruction or reclamation. This inventory includes cylinder information, estimated weight and end-users' contact information. An export permit from the source country must be approved prior to the application with the US EPA.

The export permit must be obtained in compliance with the source country's Ministry of Environment regulations. The procedure starts with an inventory of the cylinders to be offered for destruction or reclamation.

A permit from the US EPA can take up to 40 business days. The US EPA verifies the accuracy of the application including contacting the original source of the material. Once all information has been confirmed, a Non-objection notice is issued by the US EPA.

Packaging and Shipping

Proper packaging of hazardous commodities and shipping documents (shipping labels, bill of lading, Material Safety Data Sheets, export permit, and the US EPA Non-objection permit) are required. In some countries, Halons and CFCs are considered hazardous wastes and must be labeled as such when shipping. In the United States, Halons and CFCs are not considered hazardous wastes, but hazardous materials. Cylinders manufactured outside the United States are not regulated by US Department of Transportation (DOT) and therefore cannot be legally transported over US roadways. The hazardous materials must be transferred into DOT-approved cylinders.

Tracking and Documentation

Proper documentation of the US receipt of the material should include leak detection, cylinder weight, gas purity verification and actual weight calculation of the ODS or GHGs recovered.

Testing accuracy is important for verification purposes. RemTec is one of only four Air Conditioning and Refrigeration Institute (ARI) certified laboratories in the US. ARI establishes specifications and maintains quality control standards for the industry.

Certifications and Site Audits

The US EPA certifies facilities for the reclamation of ODS. This provides assurance that all materials are

DESTRUCTION OF TOLUENE TO ONE PART PER MILLION

Temperature (°C)	Residence Time (Seconds)	
1,000	>1	Incineration
2,000	3.80×10^{-3}	
4,000	0.16×10^{-6}	
6,000	5.50×10^{-9}	Plasma Arc

processed in compliance with all applicable regulations. US EPA Certification should be verified.

Site audits are useful to verify and insure compliance. For those reasons, RemTec is EPA-Certified and encourages site audits.

RemTec International is unique as a dual-processing facility for reclamation and destruction of ODS and GHGs. RemTec provides a Certificate of Reclamation or Destruction to our customers for their records. This certifies that all materials have been processed in accordance with all applicable regulations.

A significant concern to all in the chain of custody is the proper disposal at the end of useful life. The technologies for disposal are an increasingly important issue as responsibility and exposure expand.

One of the technologies for disposal that is gaining support from governmental and private sectors is plasma arc destruction, which provides several significant benefits.

Destruction Tracking and Verification

Because plasma arc destruction can accept a 100% feed of halocarbons into the destruction chamber, the waste can be tracked and measured through the destruction process.

Plasma arc destruction provides instrumentation, principally the Coriolis Mass Flow meter and pressure and temperature sensors that enable accurate tracking of the material as it is destroyed. The recording systems provide verification during the destruction process and a permanent record to validate the destruction.

Traditional incineration requires that these materials are trickle fed into a kiln with other waste streams making exact tracking more difficult.

Destruction Efficiency

Plasma arc destruction destroys the halocarbons at temperatures in excess of 6,000 degrees centigrade providing a Destruction and Removal Efficiency (DRE) of 99.9999%. The following diagram demonstrates the impact of increased temperature in terms of time required for destruction.

In this example, toluene, a solvent, requires over one second to be destroyed through incineration while plasma arc requires 5.5 nanoseconds. The environmental concern is the longer destruction time increases the potential for the ODS and GHGs to escape to the atmosphere.

For purposes of perspective, a comparison must be demonstrated in terms of light speed. Light would travel 186,000 miles in the second required for destruction using incineration. Light would travel a mere 1.6 meters using plasma arc destruction. Plasma arc provides almost instantaneous destruction reducing any potential of ODS or GHGs escaping to the atmosphere.

Reduces the potentials of Dioxins and Furans from forming

Dioxins are one of the most toxic man manufactured chemicals ever made; furans are one tenth as toxic. After the destruction process, the molecules may reform into dioxins or furans. Plasma arc significantly reduces the opportunity for reformation. The molecules are quickly combined with a caustic soda solution and transformed into salt water.

Emissions to the atmosphere are minimized

Additionally, air emissions affecting the atmosphere are de minimis since the primary effluent from the process is salt water. (See Diagram)

As responsibility and exposure increase, the proper management of these materials from cradle to grave becomes an ever-increasing concern. The tracking and technologies used for this purpose are becoming increasingly important. Combining the highest standards for tracking and verification with state-of-the-art technologies for destruction and to reduce risk and exposure for all parties in the chain of custody. IFP

HALON 1211 MASS BALANCE

Inputs	kg/kg	Outputs	kg/kg
Halon 1211	1.00	Ar	0.23
Ar	0.23	O_2	0.02
Air	0.08	N_2	0.06
Steam	0.22	CO	0.02
Caustic (46%)	2.34	CO_2	0.12
Water	16.10	H_2O (vapour)	0.01
		NaF	0.51
		NaCl	0.35
		NaBr	0.56
		NaOBr	0.07
		$NaHCO_3$	0.23
		Effluent Water	17.79
Total	19.97	Total	19.97

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Fire Protection at the Junction . . .

ASFP
ASSOCIATION FOR SPECIALIST FIRE PROTECTION

The use of board, coating and spray systems to protect steel in the event of a fire is generally quite straight forward and well documented. But occasionally a technical matter crops up that is a little outside the norm.

By The Association for Specialist Fire Protection (ASFP)

One such ambiguity concerns the approach to be adopted at the joints between two systems, when a new type of fire protection material is being installed alongside an existing alternative type on load bearing structural steel elements. The question is; exactly how do you deal with the junction, to ensure uninterrupted protection?

It is when such clarification is required that organisations such as the Association for Specialist Fire Protection (ASFP), with its wealth of technical and practical knowledge, come into its own.

The ASFP has always considered it best practice to completely protect individual structural steel, or structural elements, with the same fire protection system and that the mixing of fire protection systems should be avoided on single steel elements, since the fire testing of all possible interfaces is impractical. So, in general, the advice would be that the use of different built-in fire protection systems on individual steel or structural elements of construction should be avoided. The Association recognises, however, that on some occasions the situation is unavoidable. It has, therefore, produced new guidance on how to deal with the various scenarios.

In the first instance, the individual product manufacturers should always be contacted for relevant advice on their system being used alongside the other, but further considerations should:

- Note that off site sprayed beams are not treated at the connection point and care with interfaces will be needed. See general comments and [a] to [j] below
- The failure temperatures in fire are different for universal beams, cellular beams and universal columns. The abutting systems should be suitably selected
- The existing fire protection system, to be abutted or overlapped, must be fully cured and chemically compatible with any other system to be in contact with it

The ASFP has always considered it best practice to completely protect individual structural steel, or structural elements, with the same fire protection system and that the mixing of fire protection systems should be avoided on single steel elements, since the fire testing of all possible interfaces is impractical.

Existing type of fire protection system on the steelwork	Product being considered for adding to steelwork where [x] refers to the notes below the table		
Reactive coating*	Reactive coating [a]	Spray [d]	Board [g]
Spray**	Reactive coating [b]	Spray [e]	Board [h]
Board system**	Reactive coating [c]	Spray [f]	Board [i]

**Reactive coatings, such as intumescent paints, are defined as: products that are specifically formulated to provide a chemical reaction upon heating, such that their physical form changes and in so doing provide fire protection by thermal insulative and cooling effects*
***Fire resisting boards and sprays are defined as: products which do not change their physical form on heating, providing fire protection by virtues of their physical or thermal properties*

- Overlapping or abutting different systems needs careful consideration since they may behave in different ways in fire. For example, 'shrink back' of any system in fire, at junctions
- The specific procedure will be affected by whichever fire protection system is first applied on site and by the interval before a second system can be added.

The types and sequence of installing PFP systems can be illustrated by the table above.

Adding a reactive coating

Guidance for adding a reactive coating (a) next to an existing reactive coating system, (b) next to an existing sprayed system or (c) next to an existing board system is the same for each. Where a reactive coating fire protection system is to be added next to an existing fire protection system, the best guidance is to have a simple butt joint between the two different systems. If this is not possible, advice should be sought from the two fire protection system manufacturers and based on the test information available, or alternatively from independent consultants, as described in government guidance documents.

Adding a spray coating

When adding a spray coating adjacent to reactive coating [d], the spray should overlap the reactive coating by a minimum of 100mm where it meets a reactive coating.

Different spray systems may have different chemical compositions, so when adding spray adjacent to an existing spray system [e], contact the manufacturers concerned to confirm the chemical compatibility between the two systems. Once compatibility is established, a tight butt joint between the two systems should be used. If compatibility is not established, do not use the intended spray system.

When adding spray adjacent to existing board system [f], always contact the spray system manufacturer for the detailed procedure to be followed.

Adding a board system

When adding a board system adjacent to reactive coating [g], ensure the board system overlaps the reactive coating by 100mm where it meets the reactive coating, before being capped off. Note the need for chemical compatibility of any materials/ adhesives used with the reactive coating system.

Where a board system meets a spray system [h], the existing spray should be cut back to provide a flat edge. The board system should be capped off at the junction and a suitable overlap may need to be incorporated, if advised by the manufacturer of the board system being added.

If adding a board system next to an existing board system [i], they may be of different thickness and the joints may be complex. It is therefore recommended that the web of both board protection systems should be capped off, using the relevant protection material, to prevent the passage of fire into the web.

Note that alternative methods may be available from manufacturers for specific products. Manufacturers may, for example, advise that cover strips with a minimum specified overlap should be used. For any situation or scheduling not covered by the guidance above, consult the manufacturer of the fire protection system to be added/abutted to the existing protection system.

Junctions between protected and unprotected steel

The potential for heat transfer from unprotected structural steel into protected structural steel must also be considered. It is normally believed good practice to protect the adjoining 500mm of 'unprotected' structural steel to limit unwanted heat transfer.

The potential for heat transfer from unprotected structural steel into protected structural steel must also be considered.

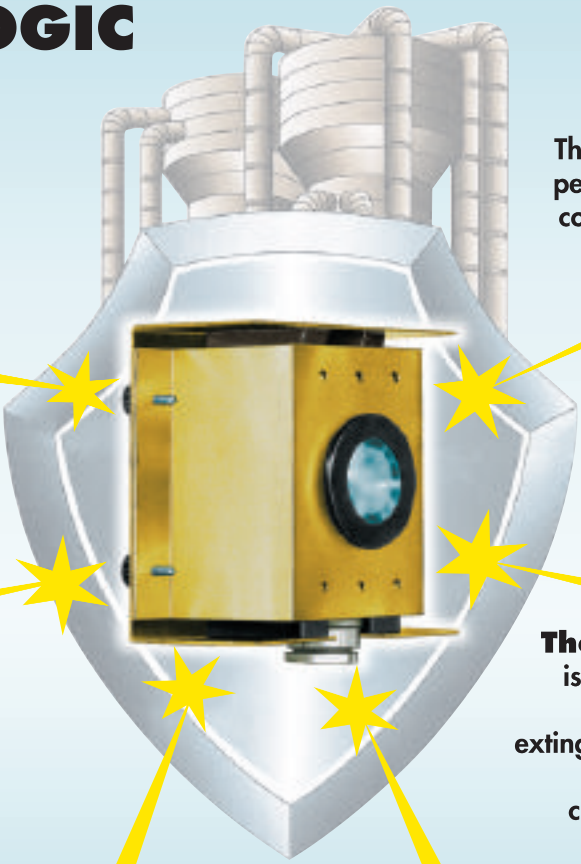
In the case of boxed systems, the end of the system should be capped off to prevent passage of fire into the web of a beam or column. This means filling the end of the boxed system with at least the same board thickness as used for the primary protection of the steel element, using tested fixing systems.

In the case of profiled spray systems, the unprotected steel should be masked prior to application of the spray such that a clean edge is achieved for the full depth of the sprayed system. Profiled board systems will be expected to have a square edge.

Further information is available from the ASFP website at www.asfp.org.uk or from the ASFP, Tournai Hall, Evelyn Woods Road, Aldershot GU11 2LL. Tel: 01252 357832. Fax: 01252 357831. Email: info@asfp.org.uk IFP

CONTROL LOGIC Spark detector

designed for dust collection systems to protect storage silos from the risk of fire.



Sparks fly at high speed.

They travel at a hundred kilometres per hour along the ducts of the dust collection system and reach the silo in less than three seconds

The CONTROL LOGIC SPARK DETECTOR is faster than the sparks themselves. It detects them with its highly sensitive infrared sensor, intercepts and extinguishes them in a flash. It needs no periodic inspection.

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ISO 9001

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Smoke, Heat and Flame

– Making Sense of Detection

There is no such thing as a one-size-fits-all fire detection solution. Here, Graham Lowe, UK Sales Manager at Hochiki Europe, which designs and manufactures a broad selection of fire detection and alarm products, explains why.

By Graham Lowe

UK Sales Manager, Hochiki Europe

No two buildings are the same in terms of hazard or fire protection. Even buildings that are architecturally similar will have their unique safety challenges. Room sizes may not be identical, evacuation routes may differ, the goods stored in each building may vary in volume or fuel load, and the fire threat posed by nearby structures or processes may have a significant impact. This, of course, is why such legislation as the UK's Regulatory Reform (Fire Safety) Order makes it mandatory for every building owner or occupier to undertake a fire risk assessment, and ensure that this assessment is kept up to date.

So, while it is essential to get expert professional advice when selecting fire detection devices, ensuring that the installation remains appropriate to changes in the building structure or use is equally vital. To put that another way, to be effective, the detection devices – indeed the fire protection installation as a whole – has to match the risk that exists when a fire breaks out; this may be different to the risk that was identified when the system was originally designed. So, the golden rule is to keep reassessing fire protection, in the form of re-visited fire risk assessments, high on the corporate agenda.

Detector options

In terms of fire detection, there have been a number of innovations in recent years that have added to the sophistication and reliability of the individual devices. However, the downside of these developments is that those responsible for fire safety can be easily confused by the options that are now available, unless they are intimately familiar with the new technology.

Essentially sensors and detectors can be fitted that detect smoke, heat and flames, and the characteristics of each depend on the type of fire detection and alarm system that is being installed. These are known as "non-addressable" and "analogue addressable" systems. In a non-addressable installation, detectors are in one of two states – normal or alarm. Individual detectors

are not identified or given a specific "address", so non-addressable systems tend to be used in smaller buildings. In an analogue addressable system, each sensor has its own unique "address" number on the control panel, and these systems are invariably the preferred solution for high-hazard, large or complex buildings, or those with complicated or phased evacuation procedures. The term "sensor" is normally used for analogue addressable devices, while "detector" usually applies to non-addressable devices.

Optical devices detect smoke using light scatter or obscuration techniques; when visible smoke enters the device's chamber some light is scattered by the smoke particles, which is then detected by the sensor. Ionisation detectors were once used for detecting smoke but are now less popular due to their radiation content and issues surrounding their shipment and ultimate disposal. Aspirating smoke detectors sense microscopic smoke particles in a sampling chamber, and beam detectors work by smoke obscuring a percentage of the light between an infrared transmitter and receiver.

Some heat detectors use what is called a thermistor to detect temperature changes, while others use resistance as a type of detection. Fixed detectors have a pre-set temperature threshold, and rate-of-rise detectors react to a sudden rise from a baseline condition. A linear detector uses a special cable to detect heat anywhere along its length. A flame detector detects either ultraviolet or infrared light emitted by a fire.

In addition to straightforward smoke, heat, flame and beam detectors the current Hochiki non-addressable offering, for example, also includes: intrinsically safe smoke and heat detectors; waterproof fixed temperature heat detectors; and industrial intrinsically safe and industrial explosion-proof flame detectors. The company's analogue addressable sensor line-up comprises: high performance optical sensors; combined optical and heat models; variable temperature and multi-heat sensors; and waterproof multi-heat sensors.

So, each type of detector is designed for a particular fire risk. Change the risk – for example, turn an office into a test laboratory – and you may well need to change to another type of sensor or detector to maintain the integrity of the installation, which reinforces the need for ongoing fire risk assessments. A failure to spot the need to change the detector may, at best, lead to the now-inappropriate device initiating false alarms; at worst, the outcome could be a fire, followed by an investigation by the local fire safety enforcing authority. Neither are appealing outcomes, particularly as modern detectors and sensors can be changed so easily, and as expert advice of device selection is so readily available.

Enhanced performance

In recent years there have been a number of improvements to detection devices that have boosted their reliability and performance. In particular, major advances have been made to their ability to differentiate between a real fire and environmental pollution or other conditions that may previously have initiated a false alarm.

For example, Hochiki incorporates what is called Flat Response high performance chamber technology into all of its optical sensors and detectors, including the intrinsically safe and marine-approved devices. This optimises the device's sensitivity to both smouldering and flaming fires. Also, by re-engineering and refining the internal optics, the sensor's or detector's reaction to a wider range of inputs has been enhanced.

A suite of false alarm management tools is incorporated within Hochiki's ESP – Enhanced System Protocol – analogue addressable open protocol to further improve immunity from false alarms. This suite, called ARM – which stands for Alarm Reduction Management – includes Drift Compensation that, when activated by the control panel, automatically recalibrates sensors every 24 hours. ESP also provides what is called full digital transmission for exceptionally secure signalling, and incorporates Checksum error checking to safeguard the integrity of the data and ensure reliably correct communication. It also has high immunity from electrical noise, so there are no false alarms due to corruption.

Siting detection devices

BS 5839 Part 1: 2002 (Fire detection and alarm systems for buildings. Code of practice for system design, installation, commissioning and maintenance) is the appropriate European standard. It provides recommendations for fire detection and fire alarm systems in and around buildings, other than dwellings. The Standard covers systems that range from those comprising only one or two manual call points and sounders to complex networked systems that incorporate a large number of automatic fire detectors, manual call points and sounders, connected to numerous inter-communicating control and indicating panels.

It sets out a number of requirements that apply to detectors and sensors. These include: the coverage radius and need for overlapping to avoid "blind spots" for optical smoke and heat detectors; the requirements for smoke and heat detectors in rooms with apex ceilings; the spacing of devices in corridors; and the positioning of devices in relation to obstructions. The Standard also covers the mounting of devices near light fittings, in ceiling voids, near lifts, elevators and stairways.

To assist installation designers and installers, Hochiki has produced a free *Guide to BS 5839 Part 1: 2002*, which illustrates the main points contained in the Standard. However, this is in no way intended as a substitute for the Standard itself. Copies are available via email to news@hochikieurope.com. IFP

Full details on **Hochiki** products are available by telephone on +44 (0)1634 260136, and via email at news@hochikieurope.com The company's website can be found at www.hochikieurope.com

Descriptive Analysis on Water Mist Fire Extinguishing Systems

Water mist extinguishing systems optimise the amount of water used through maximising their effective volume, through the dispersion of tiny droplets. This in turn maximises the cooling capacity for a given amount of water. The reduction of water volume reduces the damage that can be caused using conventional water extinguishing systems.

By Alex Palau

LPG Product Manager

The advantages of these systems are important and can be summarised as follows:

- Economical. Minimum cost of extinguishing agent
- Ecological. No harm to the environment
- Electrically non-conductive
- Efficient for flammable liquid fires
- Safe for the protected equipment and occupied personnel
- Reduction of water damage compared with conventional water systems
- Significant reduction of enclosure temperature
- Removal by washing of toxic gas and smoke
- Multi-discharge systems

Water mist systems provide a fast and efficient suppression for class A (wood, paper), B (liquid fuels) and C (electrical)* fires. They eliminate the hazard of re-ignition, offer an unparalleled suppression of deep seated fires, destroying and

filtering smokes. Perhaps the most important fact of all is that only very small amounts of water are used.

Nowadays water mist systems are used in the protection of civil and military ships, machines rooms, machinery spaces, data processing centre, bilge, cabin and public areas.

Likewise, their use in industrial applications is growing widely covering applications such as turbine rooms, machinery rooms, generator rooms, data processing centres, archives, subway and underground hazards and mobile material, etc.

The only standard on water mist systems that is currently published, NFPA 750, establishes the methodology to be followed for system design, installation and testing, indicating which parts are required to be approved, and what documentation is required. The onus is on the manufacturer to be responsible for the design and specific application engineering.

Use in Normally Occupied Areas

The most important aspect for the use of systems in normally occupied areas is that of toxicity. An extinguishing agent may create a toxic atmosphere which is hazardous to those personnel occupying the area.

The EPA (Environmental Protection Agency) in the USA established a program on Classification and Acceptance of new extinguishing agents used to substitute Halons. This program is called SNAP (Significant New Alternatives Policy).

For the approval of water mist systems for normally occupied areas EPA set up a medical panel for a study on possible health hazards associated with the inhalation of water mist from a discharge, etc.

The results of this study show no local or remote toxicity link and as a result water mist systems are approved for areas normally occupied as long as drinking water or sea water is used (Federal Registry, 28th July 1998).

Water Mist Extinguishing Mechanism

It is well known that conventional extinguishing agents, with the exception of the Halons and dry chemical powder, act on fire by means of the following mechanisms: cooling, combustible smothering or oxygen starvation. Halons and dry powder act mainly by cessation of combustion through the inhibition of free radicals. These mechanisms are described by the "fire triangle" and "fire tetrahedron".

Water mist owes its extinguishing efficiency to the combination of the following three methods:

- Cooling: Water mist has a large cooling capacity. Water spread in micron size droplets produces a large surface area for heat absorption. Additionally these micro-droplets vaporise on contact with hot bodies or gases absorbing a large amount of heat equivalent to 540 calories/gram
- Smothering: The vapour generated displaces an equivalent volume of oxygen which produces a smothering effect
- Attenuation: Radiation is produced through the increase of combustion temperature of additional black body mass. Mist formed in the protected volume significantly reduces the effects of this radiation.

Other after secondary effect is considered:

- Dilution: A degree of vapour flammability is required to maintain combustion. Under certain conditions water mist appears to decrease the vapour concentration below the flammability limit.

It is worth reflecting briefly on the combustion and flammability of solids and liquids. The combustion of solids or liquids starts when sufficient heat is present to generate flammable vapours and to reach the ignition temperature. The heat will generate more volatility of combustible material and generate a chain reaction.

It follows that any extinguishing mechanism should be produced in conditions such that the volatility and ignition occur. The efficiency of water mist is in its ability to mix within this environment. Therefore water mist systems will only be efficient if they are capable of establishing contact with the combustible material in this phase.

Applications of Water Mist Systems

Water mist systems are mainly used in the following applications described within NFPA 750:

- Fire control: Limits the spread of fire growth; "pre-wetting" of adjacent combustible materials; controlling upper combustion air temperature
- Fire suppression: Substantial and rapid reduction of fire related factors, releasing of heat during the discharge period
- Fire extinguishment: Complete fire suppression and control of combustible material.

Toxicology

There are innumerable micro-organisms in water. The two main carrier methods of disease are water ingestion and inhaling. As most of the drops exceed 20 microns in diameter ingestion is the most important method.

The conditions which affect water are:

- The type of water. It is assumed that drinking water contains few micro-organisms in comparison to non-potable water. If the concentration of chlorine is increased from 2mg/l to 4mg/l Legionnaire's disease is eliminated
- The type of container. There are containers

*Note that for Electrical Fires Class C is used in the USA and Class E in the UK.


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which facilitate the growing of micro-organisms but others that do not. Appropriate maintenance and cleaning of containers will eliminate the formations of micro-organisms.

Legionnaire's disease is transmitted by inhaling contaminated water. Assuming that little water is inhaled and that if water is inside enclosures (as in LPG systems) the risk is very low. It is assumed that in general the risk of disease transmission is low and insignificant when maintenance and cleaning operations are carried out.

It is considered that the amount of corroded pipe elements is insignificant to health.

The inhalation of water containing toxic fire components is dependent on the type of components. Part of the component could be dissolved in the water and enter into the lungs and most will be in contact with the skin and eyes. Results are difficult to establish as it depends on fire type but it is considered better to have an effective fire extinguishing system and that less smoke is generated.

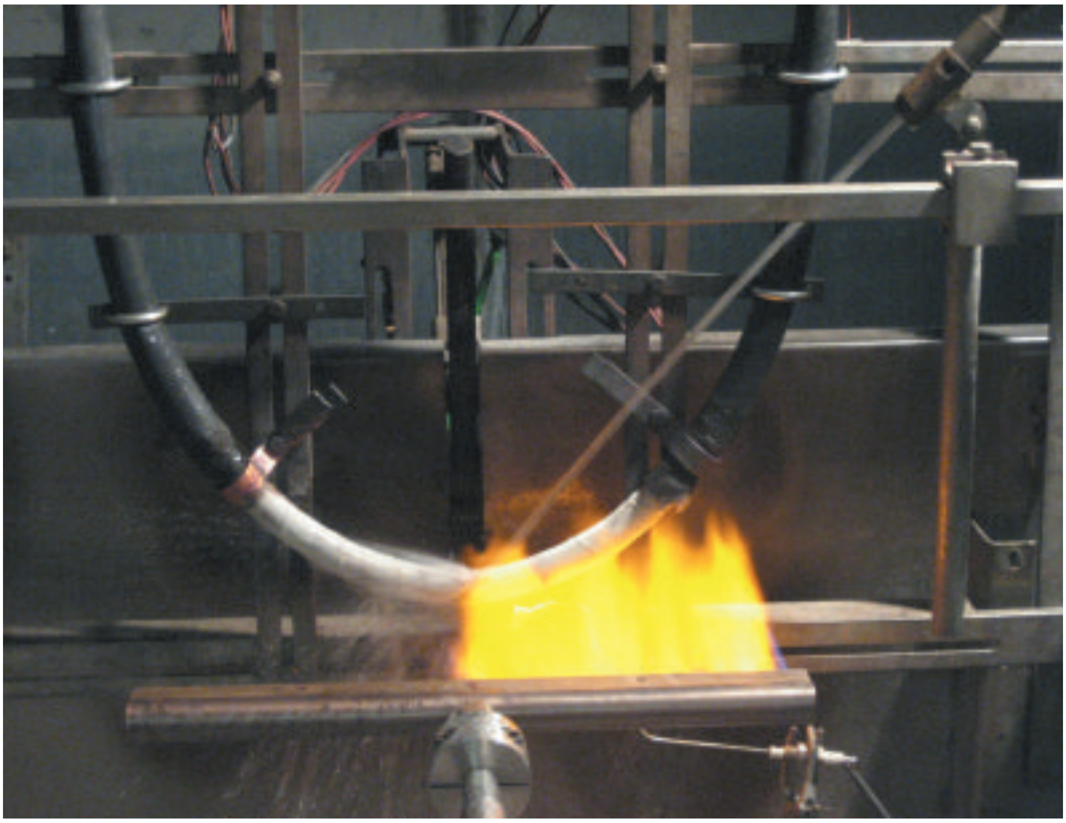
The use of water additives should be considered for each particular case and depends on the product added. Additives with low toxicity or those used in small amounts will not cause problems.

Standards

There are few standards for water mist systems and none of them will give any guidance on where nozzles shall be placed and which is the correct flow rate of them for each application. NFPA 750 standard, which can be considered as main reference standard, only describes existing water mist technologies, gives hydraulic calculations methods and gives minimum requirements for pipes, hangers . . . NFPA 750 considers that water mist systems must be listed for specific hazards and protection objectives due to the absence of a generalized design method. At his last revision (2006 edition) there is a list of worldwide published and recognized fire protocols that can be referenced (some of them are still under discussion).

These worldwide published fire protocols are published by different recognized entities (IMO, VdS, FM, UL . . .). Protocols main purpose is to evaluate water mist performance under specific conditions. It's very important to understand that protocols are design in accordance to the intended use of the fire protection system as defined by the standard or by the design and installation manual approved by a recognized entity. As an example, CEN water mist task group has develop a standard (nowadays under review) which includes a protocol to evaluate total flooding water mist system performance to protect enclosed rooms where pool fires may develop. Some of the fires on the protocol are small (around 1 MW) and obstructed. Degree of obstruction has been a compromise to guarantee full develop fire (increasing obstruction may had restricted air entrance to flame) and to provide a reasonable degree of obstruction to water droplets. It's believed that this protocol defines a representative hard enough scenario but at any case is believed that it is a real scenario. Because of that, CEN standard specifies as pass/fail criteria, that all fires described on the protocol have to be extinguished for the system to be allowed to be installed as a control system (minimum discharge time 30 minutes). IFP

Rogue Cables – a Risk



Internationally, the talk about poor quality cables is reaching a crescendo. But what is it all about? And why should it concern everyone in the fire industry? Mark Froggatt, Marketing Services Manager of UK-based cable manufacturer, Draka UK, explains.

By Mark Froggatt

Marketing Services Manager, Draka UK

When, in the UK, the former DTI (Department of Trade & Industry) – now called the Department for Business, Enterprise and Regulatory Reform – and BASEC (British Approvals Service for Cables) go public about their concerns regarding rogue cables being available on the market, it is most certainly time to sit up and take notice.

While some of the evidence is anecdotal, it is too plentiful to continue ignoring, particularly with the increasing prospect of legal action following in the aftermath of a fire. And the situation shows little sign of abating. Like many of the reputable cable manufacturers, Draka has a sin-box of sample rogue cables that is filling up fast.

The message from BASEC could not be clearer. A press release issued by the organisation included unequivocal advice to everyone in the market: do not take a supplier's claim at face value, as faulty or non-compliant products are becoming a major industry issue. Its warning is that there is now a "severe danger" of cables being supplied and installed that lack independent third-party approval and fall short of the required performance level.

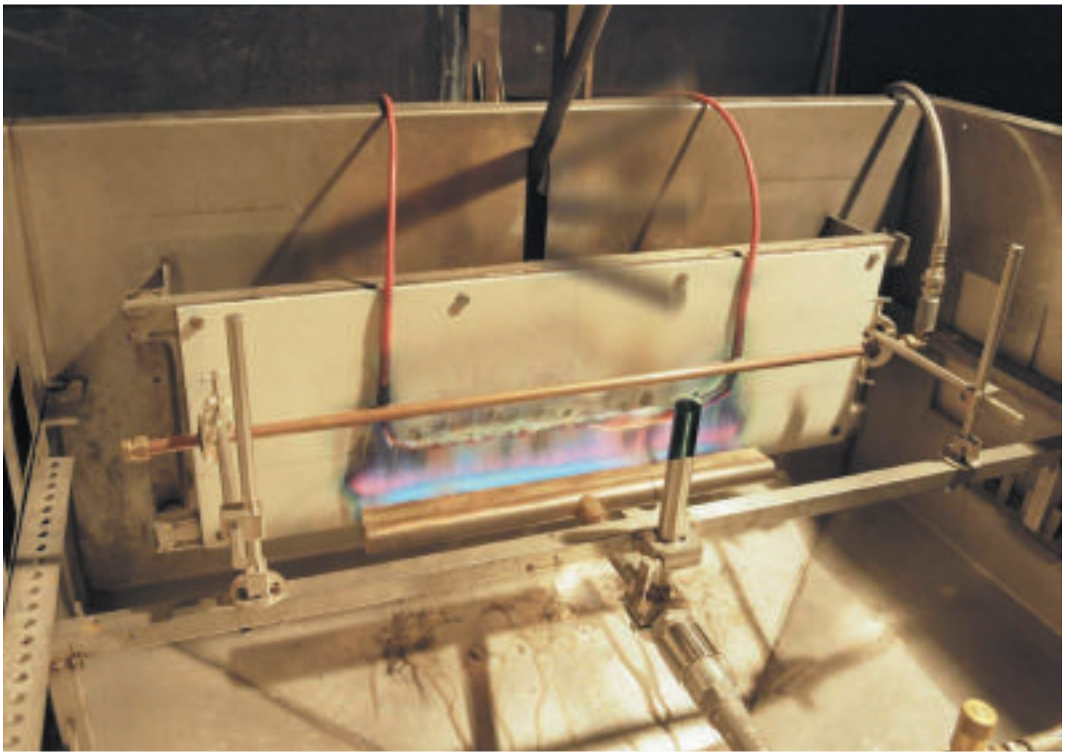
Dr Jeremy Hodge, chief executive of BASEC, is quoted as saying: "A common misunderstanding is thinking that a cable is compliant, or is even BASEC approved, just because the supplier claims that it has been produced to a certain standard. This is not the case. Cables marked with just a standard number should be treated with extreme caution. It is possible that no-one has independently examined that cable."

What's the problem?

The problem seems to have its origin in the escalating price of copper over the past few years. Reports soon circulated that some unscrupulous producers had fallen prey to the temptation to cut corners and use less copper in the manufacturing process. Reducing the diameter of the copper wire too much has the effect of reducing the current rating and increasing the resistivity of the cable. This could potentially result in overheating, which could lead to fire or reduce the level of safety against electrical shock.

From there the situation worsened. Recently, there have been instances where materials other than pure copper, such as steel wire, copper-coated aluminium or badly recycled copper have been used in cables. These instances seem to be restricted to cable originating outside of the EU, and now also seem to include incorrect cable construction resulting in inferior fire performance. This can have

Not Worth Taking



a serious detrimental impact on the safety and reliability of fire detection and alarm systems, and emergency lighting installations.

Why worry?

Because this is a problem for everyone; nobody can wash their hands of it.

Just consider the following scenario. A contractor buys cable requesting that it is to comply with a specific British, European or international standard. Cable is supplied that is proudly inscribed with the claimed standard, indicating a specific fire-resistance rating. Thousands of metres of the cable are installed when fate steps in and fire breaks out. The cable is found to be defective. Welcome to the world of litigation, substantial costs, and a reputation that has taken time to build and grow, goes from well respected and into the dustbin in one quick step.

The specifier defends his actions by pointing out that he had clearly stated the standards to which the cable must apply. Attention then swings to the installer. In turn, they show the cable the wholesaler or distributor supplied, which probably has the standard printed on the outside. They will undoubtedly argue that they asked for compliant cable, and relied on their trade supplier's expert advice and care. Finally, the wholesaler will be asked to prove that the materials supplied were backed up by the required levels of certification and accreditation from the manufacturer.

Sound bad enough? Well, that could be just the beginning. How long do you think it would be before other customers are asking questions about the "compliant" cable supplied to them? It is this scenario which is causing concern, and why there are certain reputable manufacturers who are delivering this warning message to the whole of the supply chain.

In England and Wales, for example, the Regulatory Reform (Fire Safety) Order has made the market far more conscious of the need to use only proven, third-party approved, top quality products. Relying on assertions that a cable is manufactured to a specific standard simply will no longer do. The Fire Safety Order places responsibilities on all of us to take 'reasonable' steps to ensure fire safety and so it is reasonable for wholesalers to demand independent test certification by such fully accredited organisations as BASEC, TÜV or LPCB (Loss Prevention Certification Board).

The importance of this third-party accreditation is that the specifier, the trade supplier and the installer can be sure that the cable being supplied today is built to exactly – and the key word is "exactly" – the same standard and specification as

A press release issued by the organisation included unequivocal advice to everyone in the market: do not take a supplier's claim at face value, as faulty or non-compliant products are becoming a major industry issue.

the cable that was originally tested and approved. If the cable is from a producer that does not have this third-party accreditation there is, in reality, no guarantee whatsoever that it is manufactured to the standard being claimed for it.

This is important even when buying cable from a well known manufacturer. Earlier cable from that supplier may have been up to standard, but re-sourcing materials and accepting a different specification, changing the formulation of the coating or sheathing, or modifying the design are just examples of changes that can affect the performance of a cable that still proudly – but now erroneously – bears the standard's compliance mark.

Consider for a moment the growing international trend to use fire engineering principles and techniques to devise fire safety solutions. This is particularly so for large or complex buildings, or those that establish new architectural or building design boundaries. Frequently in these structures, occupant safety, structural integrity and property protection rely solely on the dependable operation of sophisticated fire detection and alarm systems; smoke venting systems; electrically-operated fire doors and smoke curtains; firefighting lifts; pressurisation and depressurisation fans; motor-driven smoke control dampers; and pumps for sprinkler systems and wet-risers.

To be effective, these life-preserving systems and components must remain operational under fire conditions, the more so if, as is increasingly becoming commonplace, they are integrated into a single building management system. So, to ensure that they continue to operate in a fire, it is absolutely essential that the power circuits continue to function to the standard required by legislation and the specifier's requirements. Use a sub-standard rogue cable in these instances and the results could be catastrophic in terms of loss of life and the destruction of property.

The fact that these rogue cables and sharp practices have come to light actually increases the need to insist on supplying and using only third-party accredited cable and, of course, making sure that hard evidence of that accreditation is produced.

Never mind the quality, what's the price?

The fact that these rogue cables and sharp practices have come to light actually increases the need to insist on supplying and using only third-party accredited cable and, of course, making sure that hard evidence of that accreditation is produced. This gives out very positive and powerful messages. For example, it can be used to illustrate that quality is of paramount importance to the company, while also demonstrating its understanding of the increasingly legislative environment in which the market now operates, and of the need for full compliance with the country's fire safety legislation. IFP

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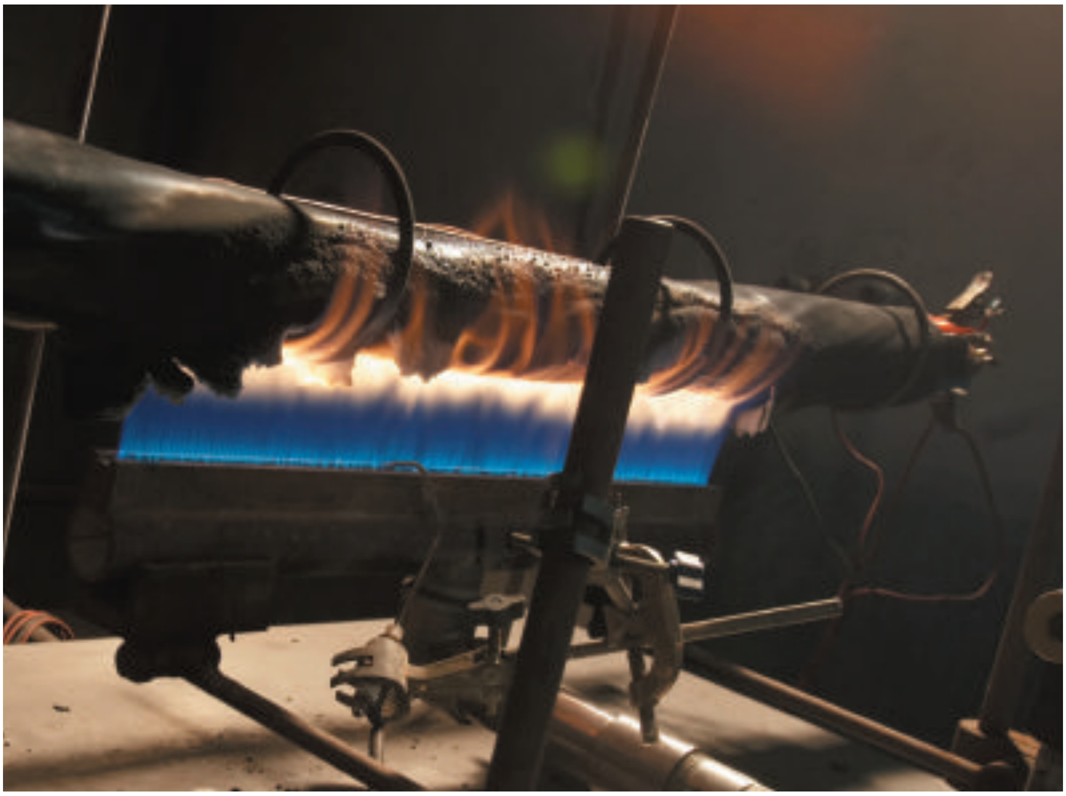

Repeating History

Recent Developments In The Firestop

"Progress, far from consisting in change, depends on retentiveness. When change is absolute there remains no being to improve and no direction is set for possible improvement: and when experience is not retained, as among savages, infancy is perpetual. Those who cannot remember the past are condemned to repeat it. In the first stage of life the mind is frivolous and easily distracted; it misses progress by failing in consecutiveness and persistence. This is the condition of children and barbarians, in which instinct has learned nothing from experience."

George Santayana, *The Life of Reason, Volume 1, 1905*

By Randy G. Clark

Manager, Firestop Technologies, International Div. Rectorseal Houston, TX

This quote from the philosopher George Santayana is often reduced to the one line: "Those who cannot remember the past are condemned to repeat it." Often this is an admonition to remember the mistakes made in the past and not to repeat them. But, this is not always the case. Yes, we must know our history but it is not all filled with mistakes. We have had numerous accomplishments in the relatively short history of our Firestop Industry. Some of the recent developments (or what well may be considered accomplishments) include those found in: Codes, Standards and in the various Organizations associated with our Industry.

If memory serves, it was in the 1988 edition of the UBC where Firestopping was first associated with compliance to ASTM E814. Before that time, compliance to Firestopping was by the use of "an approved method". This was very much open to interpretation by the Code Officials; but by prescribing compliance to E814, progress was made. At that time, the major model Building

is Not a Bad Thing:

Industry

Codes in the United States, were dominated by three regional Code organizations: Building Officials and Code Administrators International (BOCA), International Conference of Building Officials (ICBO) and Southern Building Code Congress International, Inc. (SBCCI). For many years, there had been the desire to have one Model Building Code recognized throughout the country. In 1994, the International Code Council was formed by these Code organizations to accomplish the task. There was even participation by the National Fire Protection Association (NFPA) in this endeavor. Work began on what was to become the International Building Code (IBC), which was first published in 1997. In 2000, the ICC developed a series of International Codes. During those years, NFPA pulled out of the alliance and began work on a competing National Model Building Code, to become known as NFPA 5000. Their Code was first published in August 2002 and its early 'preprint' followed the original "EPCOT" based format. Though the NFPA has a long history with the establishment and publication of Codes, for example NFPA 101, "Life-Safety Code" and NFPA 70, "National Electrical Code"; the pursuit to have their Building Code adopted by local jurisdictions has greatly fallen behind the adoption of the IBC.

It is a monumental accomplishment and an arduous task to blend three long standing model Building Codes into one document acceptable to all. It is a process of compromise as well as an opportunity to come together to strengthen the final document in areas where there may have been room to improve issues of Life-Safety. It has been the opinion of many in the Industry, including my own, that the new Code provides too many areas where 'trade-offs' occur. For example, areas where using sprinklers could allow a reduction or elimination of previously required fire rated barriers. Sprinklers have a long history as a primary active part of a Total Fire Protection Package. However, it is widely accepted that a "Balanced" approach for Total Fire Protection could better serve the public and after all, it is they, along with the noble men and women serving as Fire Fighters and Life Rescue Personnel, whom we need to protect. A Balanced approach is needed where the vital elements of Detection, Suppression and Compartmentation work together, as 'active' and 'passive' parts to complement and enhance each other; not one overshadowing the others, but all working together as a team. This is to what we should aspire.

There have been recent developments within the Standards relating to both Testing and Practices directly related to our Firestop Industry. We normally trace our Fire Test Standards to ASTM E119, "Standard Test Methods for Fire Tests of Building Construction and Materials", which was first published in 1917. It is still used today in the testing and rating of walls, floors, beams and columns. It was from the roots of E119 that our Industry produced ASTM E814, "Standard Test Method for Fire Tests of Through-Penetration Fire Stops". Underwriters Laboratories (UL) also produced similar Test Standards with the issuance of UL 263 and UL 1479, respectively. Though the NFPA published their own Standard for E119/UL 263 in the form of NFPA 251, they have as yet not published one specific to Penetrations. During the early 1990s, the Industry sought to address the Fire Testing of rated construction joints which resulted in the publication of UL 2079, "Standard

During the early 1990s, the Industry sought to address the Fire Testing of rated construction joints which resulted in the publication of UL 2079, "Standard for Tests for Fire Resistance of Building Joint Systems" in 1993 and which was later followed by the ASTM E 1966, "Standard Test Method for Fire-Resistive Joint Systems".

for Tests for Fire Resistance of Building Joint Systems" in 1993 and which was later followed by the ASTM E 1966, "Standard Test Method for Fire-Resistive Joint Systems". These standards allowed for further refinement in the testing specific to construction joints in that they allowed for the cycling of the joint, a characteristic long suspect in the severity of performance. The Standards also allowed for tests to be performed on small scale furnaces, a realistic advantage so long as the joint's length to width ratio was no greater than 10:1. The Standards maintained the integrity of the rated adjacent surfaces, in that the joint and the area adjacent to the joint must maintain the same limits for the temperature rise on the unexposed side of the assembly. Additionally, with the rise in 3rd Party Inspections, ASTM has developed specific Standard Practices with ASTM E2174, "Standard Practice for On-Site Inspection of Installed Fire Stops" as well as with ASTM E2393, "Standard Practice for On-Site Inspection of Installed Fire Resistive Joint Systems and Perimeter Fire Barriers". Both Standards lend themselves to the establishment of a more comprehensive and consistently performed inspection by providing excellent guidance for not only what needs to be inspected but also as to how the inspections can be performed.

Specifically to the testing of Through-Penetrations, UL has also added provisions to the UL 1479 and UL 2079 which call out the procedures for the option to test in order to establish both L- and W-Ratings for either Penetration or Joint System Designs. The L-Rating is an air leakage rate measured through the System determined from tests conducted at both ambient (75°F/24°C) and at an elevated (400°F/204°C) temperatures with a differential pressure of 0.30 inches of water (75 Pa). The W-Rating is for the evaluation of water tightness and indicates the level of water tightness achieved during the test by the System Design.

Specifically to the testing of Through-Penetrations, UL has also added provisions to the UL 1479 and UL 2079 which call out the procedures for the option to test in order to establish both L- and W-Ratings for either Penetration or Joint System Designs.

Even more significant to the Industry was the

issuance by UL of two revisions to the UL 1479 which: a) mandated the evaluation of the performance of Intumescent materials used within System Designs and b) eliminated the use of a 'chase' wall during a penetration test.

Often referred to as "Accelerated Aging", these tests ". . . were developed to address the performance of intumescent materials after installation." As further stated by Bob Berhinig of UL in his article, "UL's Enhanced Requirements for Intumescent Firestop Products" published in "The Fire & Security Authority", Issue 4 in 2006, he continues by writing that the test protocols ". . . require that the expansion properties (are) to be demonstrated after exposing the intumescent material to accelerated aging and high humidity conditions." He continues by saying that passage of the tests can be ". . . determined using either bench top testing methods or the traditional fire test method." Though not perfect (but what test method is), it was by this procedure that the Industry gained some uniform measure of comparative performance for intumescent products established by a world recognized independent organization.

Additionally, UL implemented a change of the test method with the elimination of the use of a chase wall for concrete floor/ceiling assemblies and wood floor/ceiling assemblies where the penetrants were contained within a fire-rated wall assembly. Before this time, the test assembly could be constructed with the penetrant housed within a rated chase wall, typically a framed gypsum wall, as it emerged from the floor. With this design, the penetrants are 'protected' from the full exposure of the fire during the test period. I have usually referred to this design as a 'bake' and not as a 'burn', because of the 'sheltering' affect caused by the chase wall. In UL's explanation of the change (published on their website), they stated that "this revision reflects a more realistic worst-case condition". When testing a penetrant such as a 3 inch (75mm) non-metallic pipe which is installed within a tight opening, a typical firestop sealant could be used at the interface of the pipe and the hole and still meet the Standard's acceptance criteria. If the pipe was fully exposed and this design was used, the firestop sealant could never close off the pipe sufficiently to pass the test. I agree that the fully exposed penetrant is worst-case, but there are site conditions where the penetrants do pass through the floor assembly into (that is through) the cavity of a framed gypsum wall, which could either be of a rated or a non-rated construction. Over the past years, our Industry has attempted to educate Building Officials to approve for use only those System Designs which match site conditions. By eliminating the ability to test and list a chase wall application, are we meeting their needs?

Lastly, the 1990s saw the formation of two significant organizations in our Firestop Industry: the International Firestop Council (IFC) and the Firestop Contractors International Association (FCIA). The IFC was formed by leading manufacturers of Firestopping Products and has for well over a decade promoted "Saving Lives and Property Through Fire and Smoke Containment". This has been done through the efforts of many dedicated people and companies by the promotion of Life Safety through the Balanced approach to Fire Protection. Through their efforts, Codes and Standards have been influenced and various Programs have been developed and used to educate and inform Architects, Engineers and Building Officials, to mention only a few. It was out of the IFC that several of the organization's associate members, mostly specialty contractors, formed what was to become the FCIA. Here too, this organization has grown and expanded in membership and influence to become a respected and influential member of our Industry.

One significant contribution by the FCIA has been their influence and work in the establishment by Factory Mutual of FM 4991, the "Standard for the Approval of Firestop Contractors". With the introduction of this very comprehensive program, Specialty Firestop Contractors have raised the bar for installers in our Industry. They have also proven influential with the architects as is evidenced by the increased appearance of specifications which call out the requirement for contractors to have completed the FM 4991 Program. Their influence is also evidenced by UL's introduction of their own procedure for a "Qualified Firestop Contractor Program". Obviously, the need in having a procedure in place by which these specialty contractors can be trained and audited has found a place within our Industry.

Santayana may have seen only the mistakes in our history and cautioned against repeating them, but there has been much good accomplished in our Industry's history in recent years. I am confident that with our many dedicated and committed people, who are willing to put Life-Safety issues above their own or their company's desires, our future will be bright. We will take the positive elements from our history and not only learn from them, but also build upon them and continue to strive toward our mutual goal of providing the best Life-Safety protection for the Public Good. IFP

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Portable Extinguishers

– Training is the Key to Safe and Effective Use

When fire breaks out, portable fire extinguishers are frequently the first line of attack. However, there is clearly some confusion about their role in fire safety, and their safe and effective use demands proper training. Steve Walker, UK Sales Manager for TOTAL® portables at Tyco Fire Suppression & Building Products, explains.

By Steve Walker

UK Sales Manager, TOTAL® portables, Tyco Fire Suppression & Building Products

A risk assessment carried out recently at a British apartment block recommended that portable fire extinguishers be removed from the common areas "as a way of improving fire safety". Considering that there is a mass of statistics from the UK and Europe that clearly show the life and property saving role that portable extinguishers play, this seems to be a very odd decision.

It becomes more puzzling with the news that it is a view that appears to be supported by the local fire brigade at a time when fire safety legislation in the UK has placed the responsibility for fire safety onto the shoulders of building owners and occupiers. It also seems at odds with other fire brigades that are actually offering training in the use of portable extinguishers. It has to be said that, if this advice to remove portable extinguishers is widely adopted, we are in for a dramatic rise in the number of fires.

It appears that these particular risk assessors believe that extinguishers are a hazard in untrained hands and could encourage people to try to tackle a blaze themselves rather than leaving

the building. But, considering the huge number of fires that are safely extinguished every year using portable extinguishers, surely it makes more sense to focus on providing training rather than removing what has proven to be a very effective means of containing a small fire?

The local brigade, according to newspaper reports, subscribes to the "get out, stay out and call the fire service out" approach. However, this advice means that the residents of this multi-storey building should resist any urge to extinguish a minor waste bin fire in the foyer, activate the alarm, evacuate the entire building and await the arrival of the fire brigade.

Facing the facts

This sounds like a credible solution until you take into account that things are very different in today's UK fire service. Following the Fire and Rescue Act in 2004, every UK fire brigade now has what is called an IRMP – an Integrated Risk Management Plan – that is aimed at the difficult task of balancing its obligations with its resources. The outcome in some parts of the country is that brigades will now not respond to an alarm unless there is "visual confirmation" of a fire; other brigades will, in the first instance, send a four-wheel-drive vehicle to assess the fire before committing further resources; others – unless there is reason to believe that people are inside the building – will not permit firefighters to enter an unfamiliar building to tackle a blaze. Also, some stations now have lower manning levels during the night.

The fact of the matter, according to a survey conducted by FETA (Fire Extinguishing Trades Association) – now merged with the BFPSA to form the Fire Industry Association – is that portable extinguishers save the British economy alone around £500 million every year and extinguish completely around 66,000 fires. Even these figures may underestimate the role played by portable extinguishers as they are designed to prevent relatively minor incidents becoming major conflagrations, so their use often goes unreported.

To put this into perspective, the 66,000 fires extinguished by portables compares with figures from the UK government's Department of Communities and Local Government that show that the fire and rescue service in the UK attended 88,400 fires in buildings in the UK in 2006. So the contribution made by the effective use of portable extinguishers is undeniable, and adopting a widespread policy of removing them would place a crushing burden on an already strained fire service, possibly with catastrophic consequences. An otherwise minor fire would be allowed to turn into a major blaze while an overstretched fire service struggles to deal with a near doubling of calls for assistance.

Train for a safe outcome

So, surely, we should be focusing on the safe use of portable extinguishers, rather than dismissing them and – as it appears to be in the British apartment block – leaving nothing in their place. In England and Wales, for example, The Regulatory Reform (Fire Safety) Order covers the common areas in such buildings, which means that there is a legal imperative to appoint a "responsible person", to ensure that adequate training is provided, and ensure that residents are aware of the fire safety precautions being implemented in the building.

The contribution made by the effective use of portable extinguishers is undeniable, and adopting a widespread policy of removing them would place a crushing burden on an already strained fire service, possibly with catastrophic consequences.

Training in the safe use of portable extinguishers is readily available and inexpensive. Many fire brigades now include information on the selection, siteing and use of portable extinguishers on their websites, as well as offering short training courses. Reputable suppliers of portable extinguishers also are only too willing to work with a building's 'responsible person' regarding the selection of the most appropriate extinguisher, its siting, providing training, and help to ensure that the legislative requirements are being met.

In essence, the training should cover emergency procedures, familiarisation of the building and its escape routes, an understanding of the different types of fire and their likely causes, the different types of portable extinguisher and their safe use, and when not to attempt to use a portable extinguisher to fight a blaze. This may, at first glance, appear to be a somewhat onerous schedule, but most training courses take between a couple of hours for a basic portable extinguisher course, to half-day courses run by such organisations as London Fire Brigade that combine portable extinguisher training with fire awareness.

In whatever form it takes, the training has to empower the user to make intelligent decisions, and to do this they must understand the significance of the information carried on the portable. One particular aspect relates to the use of portables on electrical equipment, as many portables on the market state that they have been tested and are: "safe to use on electrical equipment up to 1000v at one-metre distance". Stated in this way, rather than as suggested by the FIA (Fire Industry Association), that the extinguisher may: "inadvertently be discharged on electrical equipment…", could well imply to the uninitiated that the portable is recommended for electrical fires.

The fire industry globally is becoming ever more aware of the need for third-party accreditation as the only reliable means of verifying that products genuinely comply with the standard being claimed for them.

Train the trainer

The majority of fire risks can be easily identified during a professionally conducted fire risk assessment and most minor outbreaks can be successfully dealt with using one of the industry-standard portable extinguishers designed to fight Class A fires involving flammable solid materials such as wood, paper, straw and cloth; Class B fires involving flammable liquids or liquefiable solids; Class C fires involving gases, and Class D fires involving metals.

However, the reality is that standard portables are aimed at fighting broad-brush classes of fire, and are not designed to fight very specific fire challenges, so there is a wider training need where special risks might be encountered. This training though needs to be directed primarily towards the trade and fire risk assessors to make them aware of the special risks and the portable extinguishers that are now available to tackle them.

These special risks include: metalworking production areas where light metal and alloy waste can catch fire during machining operations and can, typically, reach temperatures in excess of 2000 degrees; mining and quarrying industries, where even the smallest amount of kinetic energy can initiate a coal dust explosion; and smouldering sawdust fires that are a serious fire hazard in every joinery shop, furniture manufacturing plant and timber processing facility. Other special risks are: fat and cooking oil fires that are difficult to extinguish, due to their high auto-ignition temperatures and where conventional extinguishers are ineffective, as they do not cool the burning fat or oil sufficiently and may even cause flashback; and polar solvent liquid fires where, again, conventional foam extinguishers are ineffective.

Training or education?

A final thought on training in relation to portable extinguishers might well come under the heading "education". The fire industry globally is becoming ever more aware of the need for third-party accreditation as the only reliable means of verifying that products genuinely comply with the standard being claimed for them. This is certainly the case with portable fire extinguishers and end users should be encouraged to put their faith only in portables that are certification by an approved, independent third-party accreditation organisation such as TÜV and LPCB (Loss Prevention Certification Board). IFP

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Storage Tank Fire Protection

– preparing for the worst

While oil and petrochemical storage tank fires are rare, the fire at the Buncefield fuel depot in England in 2005 is a stark reminder of the imperative need to provide them with truly robust firefighting solutions. So argues Peter Kristenson, EMEA Product Manager for foam products with Tyco Fire Suppression & Building Products.

By Peter Kristenson

EMEA Product Manager, foam products, Tyco Fire Suppression & Building Products

The statistics of the Buncefield fire make chilling reading; the fire engulfed more than 20 large fuel storage tanks and over 250,000 litres of foam concentrate and 25 million litres of water were needed to put out the blaze. It was the largest peacetime fire in Europe since the end of the Second World War and certainly at the top of the" major incident" scale of storage tank fires that occur, on average, once a month somewhere around the world, according to figures from Sveriges Provnings och Forskningsinstitut – the Swedish National Testing and Research Institute.

The Buncefield fire destroyed five percent of the UK's petrol stocks, resulted in the evacuation of some 2,000 homes, and is believed to have cost the site's operator and the British nation well in excess of £l billion. Just eight months earlier, the massive explosion at BP's Texas City refinery in the USA killed 15 people and injured 170 others.

So, even though petrochemical production, processing and storage facilities are constructed with meticulous care, and with painstaking attention to fire safety, tank farm fires do occur. When they do, firefighting protocols and equipment are tested to the limit.

Hardly surprising then that the industry's attention is well and truly focused on the need to employ the most effective fire safety measures. Incidents like Buncefield highlighted the necessity to embrace a more strategic approach to foam stocks and the need to forge closer working relationships between the petrochemicals industry and those companies best positioned to offer expert advice and deliver integrated agent and delivery solutions.

In reality, there are just two possible responses to a storage tank fire, the first being to let it self-extinguish by leaving the fire to burn out. Clearly

not an acceptable solution from any standpoint – environmental, economic or political – as it would result in a massive fire that would burn for weeks, possibly months, and end only with the complete loss of the stored product. This response also calls for a major cooling operation to stop the fire from spreading to adjacent tanks and nearby structures. The second option, and far more effective and acceptable, is to actively extinguish the fire. This can be achieved only by using firefighting foams.

Fixed foam protection

Effective fixed foam systems are undeniably the best method of protection for storage tanks, as they do not demand the hasty assembly of emergency equipment and manpower. However, the type of system selected depends mainly on two factors, the tank structure and the nature of its contents.

It was almost 60 years ago that the first reliable storage tank fire protection solution was developed by SKUM™. Since then, SKUM brand systems have been developed for cone roof and fixed roof tanks, open-top floating roof tanks, covered floating roof tanks, and horizontal tanks. However, an explosion – such as occurred at Buncefield – may well result in significant damage to the tank structure, seriously reducing the effectiveness of foam generators used in fixed or "over-the-top" systems. So, while such systems have a well-earned reputation for cost effectiveness and reliability, this risk has lead to the more widespread use of the less vulnerable sub-surface injection systems for applications where there is sufficient water pressure available for their use.

In sub-surface systems, foam is introduced close to the bottom of a tank through a separate foam line. The foam then floats to the surface to spread and extinguish the fire. However, extreme care needs to be taken to ensure that this technique is not used on gasoline blends that contain alcohol or other polar solvent additives as oxygenates, as polar solvents destroy the foam, even where alcohol-resistant concentrates are

used. Sub-surface injection also cannot be used on cone roof tanks with internal floaters, in accordance with NFPA (National Fire Protection Association) 11 – Standard for Low, Medium and High-expansion Foams.

The semi-subsurface injection technique overcomes this problem. It can be used for all types of fuel and has all of the benefits of sub-surface injection. This technique uses a flexible hose that is filled with foam under pressure. When the system is activated, the hose floats from the bottom of the tank to deliver the foam to the surface. This technique is cited by the NFPA as being successfully installed in more than 60 countries around the world.

Fixed monitors & generators

Fixed monitors have shown to be a cost effective method for protecting relatively small storage tanks and associated spill or ground fires. Increasingly, remotely-operated monitors with electrical or hydraulic control systems and exceptional throw performance are enabling firefighters to remain at a safe distance from the fire. So much so that monitors have been used successfully to extinguish fires in larger diameter tanks, using high-flow devices and large diameter fire hoses. Today, delivery capabilities span from 1,000 litres-a-minute up to more than 20,000 litres-a-minute. However, in accordance with NFPA 11, monitors should not though be deployed as primary protection for cone roof tanks with diameters in excess of 18 metres.

Following an explosion, horizontal tanks have been known to rupture, so it is essential to ensure that the bund area is sufficiently protected. Even for larger bund areas in major tank farms, fixed low or medium-expansion generators can be used to create an effective foam blanket, with any residual fuel in the tank being protected using a monitor. In fact, monitors can be used to protect the bund area, but this results in much higher foam consumption, and the recommendation is for at least two monitors to protect larger bunds to ensure complete coverage and the effectiveness of the equipment in all wind conditions.

Fixed systems are also now more frequently used for floating roof tanks than was once the case. SKUM has developed specialised equipment for these applications, where foam pourers are used to protect the rim seal area, with the foam being contained by a foam dam. Nevertheless, good foam fluidity is essential to ensure that coverage is achieved rapidly. Some oil companies have installed both foam pourers and sub-surface

systems to protect covered floating roof tanks.

Mobile trailer-mounted monitors come into their own as back-up for fixed foam systems, protecting the tank itself or the bund surrounding it, although with the advent of increasingly larger floating roof tanks, large-capacity monitor trailers are now also being adopted as primary firefighting solutions.

Suppressing vapour emissions

Foam is the ideal medium for the suppression of vapour from flammable liquids, toxic chemicals and LNG (Liquefied Natural Gas). For many years, it has been used with considerable success to cover un-ignited spills to ensure that ignition does not occur and provide a vapour barrier to prevent re-ignition. The best foams are fluoroprotein-based foams or multi-purpose foams, which must always be used if covering water-soluble fuels. These multi-purpose foams are, if used at medium-expansion rates, particularly effective because they engulf the spill in a deep layer of stable foam bubbles that is not easily affected by wind on exposed sites.

Toxic chemicals – chlorine, ammonia and the like – are also stored in bulk and are a significant hazard if spilled, even into a containment area. Toxic vapour clouds can spread to represent a major contamination risk and, depending on the product's reactivity, either conventional firefighting foams or specialist concentrates can be applied. Here too, medium-expansion foam is the most effective solution with a layer of at least 0.5 metres being applied within three to four minutes. The American Gas Association, British Gas and Gaz de France have conducted extensive trials to evaluate the suitability of high-expansion foam as a vapour suppressant on LNG spills. These have also shown that high-expansion foam can contribute significantly to the control of LNG spill fires.

Of course, the practice should be to contain spills, wherever possible, within drainage systems to prevent their spreading. However, fighting fires in these drainage systems using portable equipment may well jeopardise the lives of fire fighters, as the draining systems can be so complex. In such cases, fixed monitors are often installed that incorporate supplementary hose lines to extinguish any small remaining pockets of fire. IFP

The types of fire panels currently available. Confusing?

Fire protection: Fire alarm systems

New Modular Fire Panel 5000 Series from Bosch

In the past, anyone considering purchasing a fire panel was confronted with a bewildering array of different panel sizes and types. Bosch has now come to the rescue by designing a new, expandable model which can be used for a wide variety of applications thanks to its modular structure - a fire panel which grows as the needs of the user grow.

By Claus Caspari

Manager, Market Support Fire, Bosch Security Systems

A fire panel which can be used in different countries and is designed for fire alarm systems of different sizes? In the past, this would have been very difficult to achieve.

Globally, there exists an enormous number of country-specific standards and regulations for security technology, all of which must be taken into consideration when planning and designing a fire alarm system. Even the European Standard EN 54 has not improved the situation as expected. This is compounded by the numerous additional national regulations and cultural norms in every country in the field of fire alarms. It is due to these differences that there is such a large number of different types of fire panels.

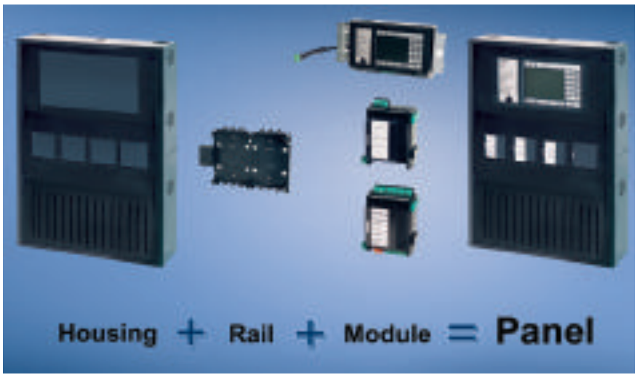
Another reason for the large number of differently-sized fire panels is the differing number of detectors, controllers, sounders etc. depending on the size of the fire alarm system.

Every fire panel is installed and operated differently. This results in high costs for time-consuming training for maintenance and operating personnel. The owner must also cover additional costs for storing the various spare parts depending on the type of fire alarm system he has. If the statutory regulations change or if the existing fire panel has to be removed due to expansion of the building, the net investment can prove to be very expensive.

Solving the problem

Neither manufacturers nor Specifiers and End-Users were happy with the status quo as described above. A new method of solving the problem had

The new design: a fire panel based on the building set principle



to be found. How could a common denominator be found for all the different requirements which a new fire panel was expected to meet?

Customer benefit had top priority:

- The fire panel has to be easy to expand
- It has to meet country-specific standards and guidelines
- The customer only has to buy the components that he actually requires
- A system which can be operated easily and intuitively
- Low training outlay, or none at all
- No need to store spare parts
- Inexpensive installation and initial set-up
- Rigid in installation and operation

The idea behind the design

A fire panel based on the building block principle was developed. This consists of individual modules which can be combined together as necessary.

The building block contains various types of housings, modules, power supply units and carrier units. These create the internal connection which is required in order to facilitate communication and the power supply between the modules. Every module is a logical functional unit.

There is a variety of enclosures and modules that can be used to create the desired fire alarm control panel. A common internal bus system automatically connects the modules and power supply. Each module has a distinct function in the system. Country specific modules are available to customize the panel to any market.

Encapsulated modules

In the past, manufacturers of fire alarm systems provided a specific level of basic equipment which the customer could expand by purchasing optional functional components. Expanding the basic equipment in this way was not an easy task. For example, the unprotected and delicate PC boards from which these functional components were made could be easily damaged through static discharge or incorrect handling.

This is resolved in the new design where the functional units consist of completely encapsulated modules which are attached to panel rails. "Click and go" is the motto. Every module is built into a plastic housing and this makes it suitable for use on building sites. The PC board can no longer be touched; static discharge can cause no more damage. The pre-wired panel rails prevent wiring errors from occurring in the internal power supply and communication data bus.

Installation

The installer gathers the modules required for the new fire panel. He is free to choose any modules he likes and to arrange them as he pleases as every module slot is identical. In line with the "click & go", the modules are simply placed in position to create the new fire panel on site in a matter of seconds. Any combination of Modules is permitted. The Modules can be placed in any rail position.

The easy-to-assemble terminal strips make it very easy to replace the modules at a later date: the modules are simply removed and then placed in position again. It is no longer necessary to disconnect the leads.

This means that every fire panel is a unique fire panel but can be adapted flexibly to the changing needs of the End user.

Initial set-up

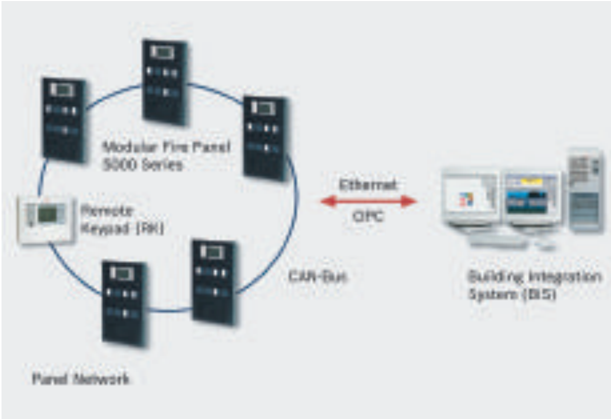
"Plug and Play" is the magic word here. Just like in a PC, the modules which have been inserted and the components which are attached to them are automatically recognized by the central control unit. This means there is no need to perform a time-consuming, expensive test of the entire system. The system can be programmed using a Windows based software program with a Windows interface. The program offers online assistance to the customers in various languges. With the The built-in diagnostic tool any fault can be analyzed in detail on the fire panel itself. It is possible to expand the fire alarm system at a later date without putting the existing system out of operation, because modules can be attached or removed while the "hot-pluggable" fire panel is still in operation.

The most important component is the LSN module. A single two-wire line ensures both the power supply as well as communication between the connected devices. In case of cable breakage, the faulty loop section is isolated automatically, prompting the loop structure to be turned into a two-stub configuration.

The LSN 300 module offers a current consumption of up to 300mA which increases the number of connectable elements on the loop strongly.

With the LSN A module it is possible to power the loop with 1500 mA. With a

The new, robust modules in comparison with the PC boards used in the past



The intelligent fire panel which grows to suit your needs

maximum loop length of 3000m this module offers high flexibility for system design.

Operation

A user-friendly interface allows a quick and effective navigation through the software in case of faults or alarms. The 5.7 inch touch screen can be easily operated by using the finger or the attached pen. A clearly laid out program interface and easy-to-follow menu navigation make for easy operation.

All major functions such as diagnosis options and complete call-up of all incoming messages and events are built into the system. The software also allows the user to sort the connected elements into different groups in a number of different ways. In this way, the user can assign functions quickly and easily to entire element groups without having to call up each element individually. With more than 10 languages in one panel, the same device can be used in various countries without time consuming SW download.

From small to big

There are scarcely any limits on how far the system can be expanded. Fire panels can be generated from a field bus line with up to 254 elements to a maximum of 32 field bus lines with 4096 elements.

Panel networking

You can connect remote keypads and network the control panels of the 5000 Series by means of the flexible and secure CAN bus technology, a technology that has been proven million fold in the car industry. The network operates on a peer-to-peer basis with its structures ensuring reliable functionality even if errors should occur. The CAN interfaces for networking are already integrated in the panel controller. Different loop topologies ensure that the system is extremely flexible, meaning that you can adapt it perfectly to meet your requirements. You can set up zones within the network to facilitate well-regulated administration.

Integration in Building Management Systems

The 5000 Series is connected to the Building Management System (BIS) by means of an Ethernet interface and the OPC protocol. It is already integrated in the Panel Controller, no additional interface module is required. The control panel is an integral component of the BIS, where you have extensive options for controlling the fire system. The Modular Fire Panel can be connected to super-ordinate control panels by means of the UGM module, thus providing integration into the environment of large-scale alarm systems.

Remote control

The new remote control unit FMR-5000 is connected to the control panel by means of the CAN bus, and allows complete controlling of the control panel or the panel network. The user interface and operation correspond to the control panel, so you can use it easily without the need for additional training. Not only does FMR-5000 offer a high level of functionality and a handsome design, it can either be mounted flush with the wall, or onto the wall itself.

Benefits and cost savings

As the fire panel can be customized to suit the customer's needs, the customer only pays for what he actually requires – unlike other products where he has to pay for more capability than needed.

The modules and the operating unit with touch screen are used as common components – both small and large fire alarm systems. Training is hardly needed thanks to the intuitive user interface and the fact that the same operation is valid for all system sizes from installations with one loop up to huge networking systems.

The new parts from the building set also act as spare parts for all fire panels, so it is no longer necessary to keep a separate supply of spare parts.

In conclusion

The module Concept allows fire alarm systems to be used for a wide range of applications, regardless of their size or structure. The new fire panel design reduces the number of different panels and panel components, by using the same components for all panel sizes. The modular concept principle lowers procurement, storage, training and expansion costs for all involved parties, while also reducing the time required for installation, maintenance and training. With at the same time increasing the flexibility in system design and installation. The modular concept allows the user to continuously growing his fire system together with his business. IFP

Remote Keypad

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santana Integrator...

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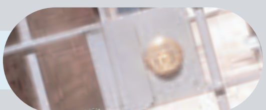

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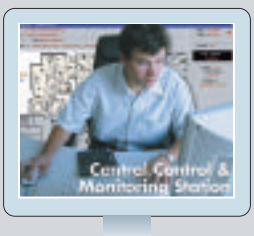

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- Full colour drawings and photographs originating from almost any Windows drawing package can be imported.
- Electronic mimic/repeater built-in.

santana SOLUTIONS

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IFP

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INTERNATIONAL FIRE PROTECTION

THE GLOBAL VOICE FOR PASSIVE & ACTIVE FIRE PROTECTION

August 2008
Issue 35

Front cover courtesy of Tyco Fire Suppression & Building Products

Publishers
Mark Seton & David Staddon

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International Water Mist Conference 2008

17 & 18 September, 2008

Copenhagen, Denmark

The 8th International Water Mist Conference is presented by the

IWMA
International Water Mist Association

in conjunction with independent member institutions

Please see

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for more information

The conference includes a site visit on the second day at the Danish Institute of Fire & Security Technology DBI with real fire demonstrations

Registration

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Hochiki protects Iceland's new power station

Sensors, beam detectors and call points supplied by HOCHIKI EUROPE are protecting completed sections of the new Hellisheidi Geothermal Power Plant that is currently being constructed south of Mount Hengill in Iceland for Orkuveita Reykjavikur [Reykjavik Energy]. Construction of the plant is a joint enterprise between Mitsubishi Heavy Industries and German company, Balcke-Durr, and the fire detection and alarm system was installed by Icelandic fire safety specialist, Ark Security.

The project called for 350 Hochiki ESP – Enhanced System Protocol – analogue addressable sensors, 95 call points and 49 beam detectors. Hochiki has also supplied a number of analogue addressable modules – 219 relay controllers. These allow multiple inputs and outputs at one physical address, which maximises functionality and minimises the number of modules. The Hochiki analogue addressable devices are integrated with ten two-loop Kentec Electronics' Syncro fire control panels that are also interfaced to the plant's high-sensitivity smoke detection system.

According to Ark Security's Kjartan Scheving, the Hochiki sensors were chosen because of their unique ability to react to a wider range of inputs than is possible with the less sophisticated sensors on the market. He says: "The 'flat response' technology that Hochiki developed all but eliminates the risk of false alarms. Additionally, the sensitivity of each analogue addressable device is set to match the prevailing conditions in the plant using the Syncro panel's intuitive Loop Explorer configuration software." He continues: "They are also automatically re-calibrated every 24 hours to compensate for any environmental contamination in the plant, ensuring that they continue to operate reliably at the specified sensitivity."

When complete in 2009, the Hellisheidi Geothermal Power Plant will generate 300 megawatts of electricity and 400 megawatts of thermal energy. This latest order from Iceland for Hochiki technology follows the successful completion of a number of major school projects that were also undertaken by Ark Security. Commenting on the Hellisheidi order Kjartan Scheving, Managing Director of Ark Security, says: "Naturally, a power plant is a high-hazard environment where fire safety is absolutely critical, so fast and reliable fire detection is essential." He continues: "We chose Hochiki over its competitors because we have never had a single instance where the reliability or performance of the company's products has been in any doubt."

Hochiki Europe (UK) has been active in the fire safety market since 1993, and is a subsidiary of the Tokyo-based Hochiki Corporation that was founded in 1918. Today, Hochiki Europe is headquartered in Gillingham in Kent and designs, manufactures and markets a broad selection of premium-build fire detection and alarm products and systems throughout Europe, the Middle East and Africa.

Further information is available by telephone on +44 (0) 01634 266 566, or via email at news@hochikieurope.com. The company's website is at www.hochikieurope.com

LPCB approval for C-TEC's XFP Fire Panels

C-TECs entire range of XFP networkable analogue addressable fire alarm panels have attained third-party LPCB approval.

Recognised by governments and regulatory authorities across the world, the approval demonstrates that all six of C-TEC's XFP panels have been extensively tested for functionality and performance, comply with EN54 Parts 2 and 4 and meet the overall standards of the Loss Prevention Certification Board, the leading international certification body in the fields of security and fire protection.

Says Charlotte Manley, C-TECs European Sales Manager: C-TEC invests millions of pounds in quality control and approvals and this accreditation underlines our dedication to manufacturing products of the very highest standards. The LPCB stamp is the ultimate seal of approval and I have no doubt that our investment will pay off. We have already received advance orders and our overseas customers are particularly delighted by the news.

Offering high performance at a very competitive price, the XFP range is ideal for office blocks, shopping complexes and big industrial sites as well as smaller, stand-alone applications.

Available as a cost-effective single loop 16 zone panel in a plastic enclosure or a robust 1 or 2 loop 32 zone metal panel, XFP panels offer an array of user and installer-friendly features including full compatibility with Hochikis ESP and Apollos XP95, Discovery and Xplorer protocols, two independently programmable conventional sounder circuits and the ability to interconnect up to eight XFP main panels onto a two wire RS485 network. The XFP is also fully compatible with C-TECs new Hush Button fire alarm solution for Houses of Multiple Occupation.

For more information, please contact the company's sales desk on +44 (0) 1942 322744.

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Fire Safety Glass Giant Invests In Future

Fire rated glass manufacturer CGI INTERNATIONAL LTD (CGI), is investing in excess of £200,000 in Research and Development (R&D) to meet modern building design challenges and satisfy architect demands.

The company has opened a new state-of-the-art R&D laboratory at its Merseyside headquarters and taken the innovative step of employing a specialist polymer chemist as it aims to continually improve the performance and functionality of its safety glass products.

Dr Vince Crook

Chemist Dr Vince Crook will lead testing and development of CGI's interlayer which is used in its Pyroguard fire glass range to provide integrity, fire and heat resistance. Dr Crook has more than seven years experience in developing fire retardant coatings and associated products.

Phill Millward, General Manager at CGI, commented: "Architects and developers are faced with the tough challenge of designing contemporary buildings that are practical, aesthetically pleasing and comply with stringent health and safety, building and fire regulations.

"Our investment in R&D is focused on continuous improvement to enable CGI to develop versatile safety glasses which withstand high temperatures and extreme testing.

"This presents architects with a product that enhances design, is flexible to work with and fit, maximises safety and meets legislation. Furthermore, using high-spec fire safety glasses can help to satisfy insurance standards and increase market appeal and value of the finished building."

CGI produces a range of fire and security glasses including Pyroguard and Fireswiss Foam. The products range from 30 minutes integrity to 120 minutes insulation depending on the thickness of the glass and are listed on the RIBA NBS Plus Specification Programme.

Phill added: "Glass will continue to prove a popular design feature of modern buildings as it harnesses natural light and allows for the combination of old and new architecture.

"Constantly investing in R&D enables CGI to effectively meet burgeoning market demand and the evolving and ambitious plans of architects."

For more information please go to the CGI International website: www.cgii.co.uk

Advanced Electronics at the heart of a new fire detection system

Intelligent fire alarm control panels from ADVANCED ELECTRONICS are at the heart of a new fire detection system for the world's largest blood processing centre. The new purpose built £60m facility for the National Blood Service, located at Filton, Bristol was opened in July 2008 and will process 600,000 units of blood per year. The centre will offer a service to 14 million people and provide blood to 90 hospitals.

Three Advanced *Mx-4400* fire panels and three mimic panels were installed by Bristol-based MAT Fire Systems Ltd, together with close to 900 Hochiki devices, including 615 smoke detectors. MAT Fire Systems also installed 10 air sampling units, 4 extinguishant systems and a complete voice evacuation system. The three 4-loop *Mx-4400* panels were installed in different locations throughout the centre and networked together to provide a single integrated solution. This allows any fire and fault condition, at any location, to be instantly alerted on all the fire and mimic panels.

The Advanced mimic panels consist of a graphical map overlaid with LEDs to indicate fire zones. This provides the user with an unambiguous display of any fire and fault condition in the building. The mimic display can be either integrated into the front door of any *Mx-4000* panel or mounted in a separate enclosure.

"The provision of open protocol solutions is a key element in any Mat Fire Systems design", said Mr Rick Coles, Managing Director of MAT Fire Systems. "The *Mx-4400* panels fully support this, and their proven reliability and excellent customer service has meant that Advanced Electronics are now our preferred supplier for large scale projects such as this one."

Advanced Electronics Ltd manufactures a comprehensive range of intelligent control and indicating panels, software and peripherals for fire detection, smoke control and the emergency lighting market. The EN54 approved Mx-4000 series and the UL 864 approved Ax-Series fire systems offer enhanced features for the end-user, system designer and installer. Advanced also manufacture the LifeLine family of DDA-compliant fire safety products for the deaf and hearing impaired.

The National Blood Service is constantly looking for new donors to meet the constant demand for blood supplies. You may be able to become a blood donor if you are aged between 17-60, weigh over 7st 12lb (50kg) and are in good health. Regular donors can keep on donating until they are 70.

For further information or to make an appointment to donate call the NBS helpline on 0845 7 711 711 or visit www.blood.co.uk

Fire safety for all markets

By Trevor Gage

Director & General Manager,
Clifford & Snell

Recent news highlighting the anniversary of the Piper Alpha disaster in the North Sea serves as a stark reminder of the dangers encountered in the Fire Safety industry.

Commercial constraints on costs are an ever-present consideration, however, compliance to various International Standards and Approvals means that industry is in a position to demand higher quality, performance and reliability from the manufacturers and suppilers of safety equipment.

Based in South-East London, Clifford & Snell has led the market in terms of the investment in research and development of audible and visual alarm products – particularly in Hazardous and Intrinsic Safety Areas. Key to optimum operation of any system is making the correct product selection for a specific application, ensuring that its design meets the required specification, it performs as required during operation and, finally, that any maintenance is routinely carried out, as specified.

Manufacturers of product for safety warning systems has evolved over several decades and the speed of its development has been accelerated by the growing needs of the Oil and Gas markets which supports the ever increasing energy demands of Western industrial countries as well as the emerging economies of Asia and the Far East.

Hazardous Areas and Intrinsic Safety

The demands and requirements of this market sector cannot be underestimated – both in terms of human operator safety and equipment safety. The risks are considerable and destruction of a gas platform or refinery can bring about huge financial losses. The safety products specified, therefore need to be covered by the safety legislation and complementary project management services for safety monitoring and maintenance. In this market, Standards and the Certification process are essential and play a key part in the design and development process. The company's Yodalex range of explosion-proof sounders and strobes, for example, meet all relevant industry standards including North American, UL and CSA Standards and in Europe, ATEX European Directives for Gas & Dust as well as GOST-R Approval for Russian applications and the International approval IECEx, allowing compliance on a truly global basis.

Hazardous Area Products can be categorised under Ex d Flameproof and Ex ia Intrinsically Safe equipment and the Yodalex range meets all the requirements offering an explosion-proof audible and visual alarm as an integrated combination unit.

Industrial Process and Control

To maximise safety of employees and equipment whilst minimising down-time within industry, early

indication of malfunction or process breakdown is important. The company's range of sounders & strobes provide reliable audible and visual alarm status for process control as well as fire/security and marine applications. A two-stage alarm function, 32 sound tones, dc and ac supply voltage options and a choice of seven lens colours, ensures total flexibility meeting the needs of most applications. Approvals for this market sector include UL cULus, VdS, GL and EN54-3.

Fire and Security

Recent hotel and warehouse fires indicate that loss of life and substantial loss of property and equipment is still a very real possibility – regardless of geographical location and the excellent support of the fire services, these events continue to take place. New legislation has to be continually monitored by manufacturers and the implementation of EN54-3 is essential for applications covering fire alarm systems. Clifford and Snell's Yodalarm and Yodac range offer precisely the solution to most of these applications. The Yodac range is a modular concept system providing common architecture through a series of universal components for Fire applications within public areas, commercial buildings, transport sector and marine environments. Offering numerous frequency options, sound output levels, voltage variations, sounder and strobe combinations all in flame-retardant materials, these products conform to the latest CE requirements and European Directives. IFP

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Website: www.kmpr.co.uk

SEVO® Systems Launches a "One for One" Halon Retrofit Fire Suppression System

– utilizing 3M™ Novec™ 1230 Fire Protection Fluid

SEVO SYSTEMS announces the availability of their "One for One" halon retrofit fire suppression system, utilizing 3M Novec 1230 Fire Protection Fluid, as a replacement for halon and HFCs in fire suppression systems. The SEVO 1230 "One for One" retrofit fire suppression system simplifies the conversion from halon 1301 to Novec 1230 fluid. Generally the existing halon 1301 piping network can be utilized and the existing halon 1301 cylinder will be replaced with a SEVO 1230 cylinder containing Novec 1230 fluid pressurized to 500 psig along with replacement of existing nozzles. The SEVO 1230 "One for One" retrofit system minimizes the space required because the same number of cylinders is required. This reduces the overall installation cost for both labor and hardware. The system is approved by Factory Mutual, a Division of FM Global, and a major industrial insurer. The SEVO 1230 "One for One" retrofit system is the only one of its kind available using Novec 1230 fluid.

SEVO Systems was formed in 2001 and worked to develop and commercialize systems using a revolutionary new technology invented and marketed by 3M that represented a major breakthrough in halon replacement technology – combining high extinguishing efficiency with excellent environmental, health and safety properties. With highest life safety margin of any viable chemical clean agent, zero ozone depletion potential, 5-day atmospheric lifetime and a global warming potential of one, Novec 1230 fluid offers the market a long-term, sustainable alternative to halon and HFCs. SEVO worked hand-in-hand with 3M during the early development period following its discovery. SEVO represents a "safe environmental choice" and was the first OEM partner of 3M to commercialize a UL approved fire suppression system using Novec 1230 fluid.

Novec 1230 fluid is designed to balance the need for extinguishing performance, human safety and minimal environmental impact. Novec 1230 fluid is not included in the basket of greenhouse gasses identified by the Kyoto Protocol. The production of halon has been phased out in developed countries and will continue to be phased out in developing countries based upon the Montreal Protocol. With a zero ozone-depletion potential, an atmospheric lifetime of just five days (compared to 65 years for halon 1301) and a global warming potential of one (compared to approximately 3500 for HFC-227ea or HFC-25), 3M stands behind Novec 1230 fluid by offering an industry-leading 20-year warranty, the 3M Blue SkySM Warranty. For complete terms and conditions or to register your system for the Blue Sky Warranty, log onto www.3M.com/novec1230fluid. For further information regarding the SEVO 1230 "One for One" halon retrofit system log onto www.sevosystems.com.

SEVO is a trademark of SEVO Systems, Inc. 3M and Novec are trademarks of 3M. Other trademarks or names may be the property of their owners.

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Lenexa, KS 66215
Tel: 913-677-1112 or Fax 913-384-5935
Email: info@sevosystems.com

Cooper Fulleon Ltd announces new suite of VdS approved products

COOPER FULLEON LTD is pleased to announce an expansion of VdS approvals on its core sounders, beacons & AV products. Cooper Fulleon Ltd has been working hard to ensure that all of its products meet the latest legislative requirements including the Construction Products (CP), Waste Electronic & Electrical Equipment (WEEE) & Restriction of Hazardous Substances (RoHS) Directives. The addition of the VdS approvals will help our customers fulfill specific requirements where these approvals are demanded

VdS approval is an accepted norm in Germany and several other countries worldwide, and the addition of VdS approvals to our core range means that Fulleon products not only meet legislative requirements, but are endorsed by a well respected & internationally recognised third party organisation. VdS have also conducted successful Factory Production Control (FPC) Inspections at Fulleon.

The products now approved to VdS requirements include the RoLP, Askari Compact, Squashni, Squashni Micro, Symphoni, Symphoni High Output, Flashni, RoLP Solista and Solex. If you are interested in any of our VdS approved products, please contact our customer services department on +44 (0)1633 628566 who will be happy to help.

About Cooper Notification

Cooper Notification, a solution platform of The Cooper Safety Division, is comprised of several businesses that have decades of experience and innovation in the development of high quality products and solutions. With the ever present need to protect, alert and inform, Cooper Notification is focused on meeting the growing demand for personnel and property safety. We are the source for notification solutions including Wheelock fire and security notification appliances and devices, SAFEPATH and WAVES voice evacuation and mass notification systems, Wheelock and MEDC industrial signaling and Roam Secure personal and regional alerting. For more information, visit the web site at www.coopernotification.com

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Bosch Modular Fire Panel 5000 Series wins Polish Champion of Security Technology Award 2008

Modularity, reusability and ease of use impress panel of judges

- Single modular system for all requirements
- "Click-and-go" modules and interchangeable housings
- Easy to install and operate

Bosch Security Systems' Modular Fire Panel 5000 Series has won the Polish Champion of Security Technology Award 2008.

The award is granted by POLALARM, the Polish Association of Producers, Designers and Fitters of Alarm Systems. The competition covers eight categories: Intrusion, Fire, CCTV, Access Control, Alarm Visualization Software, Alarm Transmission Devices, Car Alarm Systems and Personal Protection Devices. The Modular Fire Panel 5000 Series won in the category "Fire".

The Modular Fire Panel 5000 Series allows a fire alarm system to be configured according to the specific needs of the building: from an isolated control panel with one loop to a complex panel network. The modular system provides reusable "click-and-go" modules, rails and interchangeable housings that are easy to install and operate.

In addition to its modularity, the Modular Fire Panel 5000 Series also impressed the panel of judges for its touch-screen, intuitive menu and ease of operation.

"Installation and operation of the 5000 Series panel are extremely straightforward," says Krzysztof Góra Productmanager Fire. "The user interface has been ergonomically designed for intuitive operation with a large display. In addition, all indicators and buttons are located directly on the associated modules, making them even easier to use and minimizing operator errors."

Flexible programming is another key feature of the device. Updates to configurations are uploaded to the panel using a laptop computer, locally or by remote programming. IFP

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Website:
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Draka unveils new armoured power cable

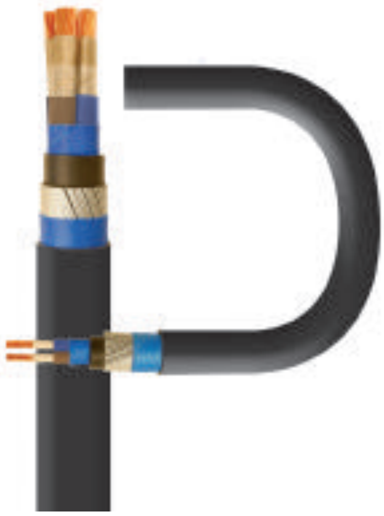
Draka has unveiled a new 600/1000V SWA [Steel Wired Armoured] enhanced-performance power cable. It provides the superior characteristics required by today's sophisticated fire engineering solutions and the more widespread utilisation of fire engineering principles and techniques that call for greater reliance on complex life and property protection systems and protocols.

These fire engineered solutions are becoming increasingly commonplace globally, requiring a secure power supply that will retain its integrity in the event of fire. This is particularly so in the UK, following the introduction of the Regulatory Reform (Fire Safety) Order. Additionally, Clause 5.38 of the new Approved Document B (Fire safety) 2006 of the Building Regulations for England and Wales recognises that it is essential that the power circuits continue to function. It requires "sufficiently robust cables" to be used "where it is critical for electrical circuits to be able to continue to function during a fire". This impacts on fire safety systems including: automatic fire suppression installations; fire detection and alarm systems; fire compartmentation; smoke control and ventilation; sprinklers and wet risers; ventilation and shutters; and firefighting lifts.

Draka's new Firetuf Powerplus provides this enhanced circuit integrity performance and meets the demanding requirements of BS 7346-6:2005 *[Components for smoke and heat control systems: specifications for cable systems]*. It utilises high-performance materials to achieve the maximum 120-minute rating when subjected to integrated testing involving flame irradiation exposure, direct impact and high-pressure water spray. These tests were originally part of BS 7346. Recently though they have been published as a stand-alone standard, as BS 8491:2008 *[Method for assessment of fire integrity of large diameter power cables for use as components for smoke and heat control systems and certain other active fire safety systems]*.

The enhanced circuit integrity of the new cable preserves the handling and installation characteristics of the wire armoured design. It is a development of Draka's Firetuf Power cable that was introduced to meet the requirements of BS 7846:2000 *[Electric cables: 600/1000 V armoured fire-resistant cables having thermosetting insulation and low emission of smoke and corrosive gases when affected by fire]*. Firetuf Powerplus is LPCB [Loss Prevention Certification Board] third-party approved and is available in two, three and four-core options with nominal conductor areas spanning from $10mm^2$ to $400mm^2$.

Firetuf Powerplus is ideal for what Approved Document B describes as: "large or complex buildings where there may be fire protection systems



that need to operate for an extended period during a fire". Further guidance on the selection of cable for such systems is given in: BS 5839-1:2002 *[Fire detection and fire alarm systems for buildings. Code of practice for system design, installation, commissioning and maintenance]*; BS 5266-1:2005 *[Emergency lighting. Code of practice for the emergency lighting of premises]*; and BS 7346-6:2005.

In the past, this requirement for a higher performance standard was met using mineral insulated cables that incorporate insulation of highly-compressed Magnesium Oxide. While certainly a robust and durable solution, the cables' high material cost and the difficulty and expense of forming cable terminations has seen a decline in their use. While there are at least two options to mineral insulated cable now available on the market capable of satisfying this demand, currently Draka's Firetuf Powerplus is believed to be the only one that is third-party approved.

The importance of this third-party accreditation by such organisations as BASEC [British Approvals Service for Cables] or LPCB is that it is the only way in which specifiers and installers can be sure that the cable being supplied is to the standard being claimed for it. A cable marked with just a BS or EU number should be treated with extreme caution, as it is quite possible that no-one has independently verified the manufacturer's claim. IFP

Full details on Draka's Firetuf Powerplus are available by telephone on +44 (0) 1332 345431, by fax on +44 (0) 1332 331237, and via email at firetuf@draka.com. The company's website can be found at www.drakauk.com

NEW - FIRETUF POWERPLUS

Enhanced power cable performance to meet BS 7346-6 and BS 7846.

BS 5839-1: 2002

Firetuf is approved to the highest standards, providing superior flame retardance and circuit integrity.

NON MELT AND DRIP

Firetuf products will not propagate and cause secondary fires.

EASY STRIP

Firetuf provides the fastest ever sheath removal, allowing reduced termination times.

ZERO HALOGEN LOW SMOKE

Our OHLS cables are manufactured to deliver optimum performance across a range of applications.

FUTURE PROOF

Concerned about new fire safety legislation? Relax, the Firetuf range is the highest standard cable available today.

AS FIRETUF AS THEY COME

Firetuf® from Draka is the ultimate circuit integrity cable. Manufactured and approved to the highest standards, Firetuf delivers unbeatable benefits to specifiers and installers of fire engineering systems. And with our brand new Firetuf Powerplus range of power cables, delivering enhanced performance to meet BS 7346-6 and BS 7846, you can trust Draka to provide the complete solution to all your specialist cable needs. To find out more call 01332 345431 or visit our website www.drakauk.com

Draka

The world's most trusted cable brand

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Tandem exting
twice the prote

Total flooding is not appropriate protection for all assets, yet portable extinguishers are effective only if there is someone around to operate them. Now, Tyco has come up with a solution. Steve Walker, UK Sales Manager for TOTAL® portables at Tyco Fire Suppression & Building Products, explains.

Businesses are becoming ever more dependant upon assets that are central to the organisation's ability to perform. Most of the focus goes on protecting IT and telecommunications equipment, for which total flooding gaseous suppression is frequently the ideal solution. However, many companies have specific items of manufacturing or processing equipment that are vital to the smooth running of the operation and without which the business may soon grind to an alarming halt. Often, these are not "enclosed" and so do not lend themselves to total flooding, even if the cost of such an installation could be justified. They may also be remote from the company's main facility and so beyond the protection of the main fire detection and alarm or fire suppression installation.

The Tandem extinguisher can be used both in the conventional manually-operated manner during normal manned working hours, and as a fixed unattended automatic extinguisher when the facility is unmanned.

There are also numerous instances, particularly among small and medium sized enterprises, where workshops, offices, temporary portable accommodation, shops and petrol station forecourts need cost-effective around-the-clock protection. Typically applications include waste containers, small storage areas, machine and engine enclosures, production equipment, and heating and air conditioning plant.

Clearly, what these areas need is an independent, versatile, cost-effective yet reliable solution, and the recently introduced TOTAL® brand Tandem multi-purpose fire extinguishers are designed precisely with this aim in mind. The Tandem extinguisher can be used both in the conventional manually-operated manner during normal manned working hours, and as a fixed unattended automatic extinguisher when the facility is unmanned.

Tandem extinguishers are permanent stored pressure models that incorporate a pressure gauge

to ensure permanent pressure control. When the valve is opened, the pressure forces the extinguishant out of the extinguisher using Nitrogen as the propellant. They are available with either foam or

uishers offer ction

dry powder suppressant and are suitable for both Class A and Class B fires as set out in BS EN 2:1992 *(Classification of fires).* Class A fires involve freely-burning organic solid materials such as wood, paper, straw, cloth, textiles and other carbonaceous materials, and Class B fires involve flammable liquids or liquefiable solids such as petrol, diesel, solvents, lubricants and spirits. Tandem powder extinguishers are also appropriate for Class C fires involving gases such as butane and propane, but only when they are used as a portable extinguisher.

When a Tandem extinguisher is wall-mounted for automatic operation, a special 68°C sprinkler sensor activates the agent flow and directs it at a specific fire risk to provide around-the-clock protection. When used in this automatic mode, the extinguisher delivers a "one-shot" flow when the sensor is activated and, depending on the height at which the extinguisher is installed, the protected area can extend to between four and six metres from the extinguisher. When used as a conventional manually-operated portable extinguisher, delivery of the powder or foam agent is trigger-controlled.

All Tandem portables are safe if inadvertently used on electrical equipment up to 1000v at one-metre distance and have anti-freeze protection of to minus 20°C for the powder models and zero °C for the foam extinguisher. The current offering comprises a 9-litre foam extinguisher and two dry powder models – a 6kg unit and a 12kg unit.

They are manufactured under ISO 9001:2000 *[Quality management systems]* and in accordance with the European standard for portable extinguishers is EN 3: 1996, Part 3 and Part 6, and BS EN 3 Part 7: 2004, which replaced the earlier Parts 1, 2, 4 and 5. Part 3 addresses construction, resistance to pressure and mechanical tests, while Part 6 covers conformity and how to achieve certification. The newer Part 7 encompasses characteristics, performance requirements and test methods.

The CE-marked Tandem extinguishers were developed at the dedicated TOTAL research and manufacturing facility in Neuruppin in Germany where, unlike many portables now available on market, virtually every stage of the cylinder manufacture is under TOTAL direct control. This includes material selection and sourcing in Europe, the use of the most advanced low-heat plasma welding techniques and equipment, fabrication, assembly and high-performance powder-coating. It also embraces 100% cylinder pressure testing; and agent filling. To provide a complete and reliable quality audit trail each and every Tandem cylinder is uniquely numbered during manufacture.

Each Tandem cylinder has a one-millimetre-thick corrosion-resistant internal powder coating and is electrode-tested to ensure that there are no pin-point flaws in the coating. The quality of this finish can be judged by the fact that there is a complete absence of colour fading that is a common feature of many inferior quality cylinders. Even the Tandem cylinder wall-mounting brackets are designed to ensure that there is no potential for metal-to-metal or metal-to-wall scuffing.

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Tandem extinguishers are part of an extensive line-up of TOTAL special-application portables. Other models include powder extinguishers for coal fires; antimagnetic CO_2 portables for hospitals and clinics; specially-formulated water portables for sawdust fires; wet chemical portables for cooking oil and fat fires; purpose-designed foam portable extinguishers for polar liquid fires; and specifically formulated powder portables to fight metal fires. All are guaranteed for five years, providing they are serviced from new in accordance with the appropriate regulatory standards.

They are available in the UK through Express Fire in Manchester and from a country-wide network of approved TOTAL supply partners that are trained to advise, install and maintain the right extinguishers in peak condition. Further details on TOTAL portable fire extinguishers are available from Express Fire on + (0) 161 688 5050 or, outside of the UK, from Tyco Safety Fire Suppression & Building Products by telephone on +44(0) 161 875 0400, by fax on +44 (0) 161 875 0491, or via email at tspmarketing.emea@tycoint.com IFP

Fire Protection Buildings

Eisenhower Executive Office Building, RJA/Baltimore

We have all been witness to an unfolding story on the evening news or internet that portrays the destruction of an historical structure by fire. This scenario plays out the same in cities and towns across the world each year. The loss of these structures is devastating to the communities and to the entire historical preservation community. Furthermore, these structures are forever lost and the only reminder left behind are countless photos of the building's glory days.

By Joseph A. Castellano, P.E.

of Rolf Jensen & Associates Inc

Fire does not prejudice between churches, schools, libraries, houses, theatres, warehouses, museums, etc. All buildings with combustible construction or combustible interiors are susceptible to fire. We in the fire protection community are knowledgeable about protection schemes to mitigate the loss of historic structures in fires and to educate the community at large as to the benefits of providing such fire protection in these structures. So why are we not protecting more of these buildings with good sound fire protection? The answer: money and concern.

Financially, retrofitting an existing historic structure with good fire protection does not come cheap. Often times, fire protection upgrades occur when an historic building undergoes some level of either restoration or renovation, where the costs of the fire protection is part of a larger restoration cost and more easily justified. These upgrades can also occur over several project phases that may encompass a number of years to complete. Many local communities have historical preservation societies that may own and/or be involved with a number of historic buildings. Many of these

in Historic

societies operate primarily by grants and charitable donations with limited funding. Thus, money will always be a primary issue in providing good fire protection in historic buildings.

Meeting the financial challenge of saving these historic building has evolved this concept of 'adaptive reuse'. Many cities in need of addressing urban blight, have developed revitalization programs where developers are able to renovate historic structures and permitted to change its use and occupancy and turn these neglected buildings into thriving mixed-use facilities, office buildings and residential lofts, to name a few. These renovations will normally include upgrades to the fire protection to include the installation of a fire sprinkler system.

The other primary reason historic buildings are not provided with good fire protection is concern from the preservation community over the removal or alteration of any distinctive architectural feature of the structure. These concerns are not unfounded due to a combination of lack of planning, communication and careful coordination with the historic preservation professional. These failures can sometimes be linked financially where a project cut a corner to meet budget and the end result was an aesthetic failure.

Since the 1940's, the National Fire Protection Association (NFPA) based in Quincy, MA, organized a committee to address fire protection in historic structures and published its first document in 1948, *Protecting Our Heritage: Historic Buildings, Museums, and Libraries*. NFPA developed a series of recommended practices to address these special structures. Five separate documents detailed the specific requirements for museums, libraries, places of worship, historic structures and historic sites. Today, NFPA publishes two codes that specify requirements for historic structures; *NFPA 909 Code for the Protection of Cultural Resource Properties – Museums, Libraries, and Places of Worship* and *NFPA 914 Code for the Fire Protection of Historic Structures*. While both codes have similarities in content, NFPA 909 provides specific guidance to libraries and museums not covered by NFPA 914. Both codes are an excellent resource in developing a code compliant fire protection strategy in historic buildings. Specifically, NFPA 914 identifies a process by which an assessment strategy is presented that considers both the fires safety features as well as the historic integrity of the structure. As part of the process, it recommends persons with expertise in both historic preservation as well as fire protection are involved. The process presented in NFPA 914 is intended to focus on three key areas;

1 Protection of the building occupants
2 Protection of the building contents
3 Protection of the structure

NFPA 914 also identifies two distinct paths of assessment, a prescriptive based option or a performance based option.

With the increasing understanding and acceptance of performance based design both in the U.S. and abroad, the fire protection professional is provided with a very powerful tool in achieving fire protection design solutions in historic buildings. A performance based design is intended to achieve a specified goal for a specific use, whereas, a prescriptive based design prescribes fire safety requirements for a generic use or application. The obvious benefit for historic buildings is to achieve a design solution specific to the needs of the specific structure in lieu of applying a generic code requirement to fit the historic building. Prior to the acceptance of performance based design, code enforcement officials were challenged and reluctant to accept alternate code compliance strategies to the prescriptive code requirements. Now, in many jurisdictions, code enforcement officials can accept a performance based design as an alternate to the prescriptive design approach to achieve a specific design goal or objective. In addition, they can request an independent third party review of the performance based design providing assurances of the design approach.

Computer fire modeling has also made technical advancements over the past ten years, where today, a qualified fire protection professional can create and run fire models using his desktop computer. Computer fire models allow the fire protection professional to evaluate a space, a room or a building by designing a realistic fire based on actual furnishings and contents of the space and evaluate the performance of the proposed fire protection solution against its stated objective. If the desired objective is not achieved, an alternate protection scheme can be evaluated to obtain the desired results. Computer fire models can also simulate emergency egress from a space or building to determine safe egress time for the building occupants. This combined with performance based design provides an unprecedented opportunity for the fire protection professional to achieve good fire protection for historic buildings.

Many cities in need of addressing urban blight, have developed revitalization programs where developers are able to renovate historic structures and permitted to change its use and occupancy and turn these neglected buildings into thriving mixed-use facilities

The Georgia State Capitol Building, RJA/Atlanta Office

For example, an historic three story courthouse building without an automatic fire sprinkler system is provided with unenclosed interior exit stairs. The building owner is considering a building renovation and wants to know if he will need to upgrade the exit stairs to add two enclosed stairs. The fire protection engineer meets with the building owner and the historic preservation professional and tours the facility to better understand the facility and concerns from a historic preservation perspective. The fire protection engineer develops a performance based design approach using computer fire modeling to achieve the design objectives communicated between the stakeholders to include the owner, preservationist, fire protection engineer and code enforcement official. The end result is adding a fire sprinkler system to the building that would mitigate the spread of a fire and allow the unenclosed interior exit stairs to remain without separation. The computer fire and egress models demonstrated safe egress time for the building occupants from the building with the unenclosed exit stairs and the addition of a fire sprinkler system. The performance based solution provided a fire protection scheme for an historic building that satisfied all stakeholders using computer fire modeling.

Fire protection in historic buildings is essential to reducing the loss history of these landmark buildings. Advancements in fire technology, computer fire modeling and performance based design have made the solutions to these problems more achievable. Continuing to communicate the advantages and benefits of good fire protection to owners of historic buildings and demonstrating that such upgrades can be achieved without degrading the historical significance of the structure is also critical. Three keys to achieving good fire protection in historic buildings;

1. At the onset of a project, gather the project stakeholders and outline the stated goals and objectives of historic preservation and fire protection planning. Include the code enforcement official in this discussion.
2. Establish realistic budgets at the onset of the project that incorporate the goals and objectives identified by the project stakeholders.
3. Communication between the owner, the design professionals, the contractor and the code enforcement officials is critical throughout the project duration towards achieving good fire protection in historic buildings

As fire protection professionals we have a shared responsibility to encourage owners of historic buildings to upgrade the fire protection to a level that is equivalent or greater than what is required for new construction so that future generations may enjoy the historical significance these buildings bring to our communities. IFP

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Fire protection in historic buildings is essential to reducing the loss history of these landmark buildings. Advancements in fire technology, computer fire modeling and performance based design have made the solutions to these problems more achievable

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The adaptability glass

Fire protection makes sound sense

It is a great benefit when several functional objectives can be achieved at the same time by the same specification, especially when the separate requirements are in themselves individually challenging. The perfect example is the design flexibility provided by fire-resistant laminated glass based on a special glassy intumescent interlayer.

By Mike Wood

Global Consultant, Fire Protection and Glass Design, Pilkington

Fire resistant glass of this type is used extensively throughout modern buildings. Its fire resistance pedigree is well recognised and its ability to bring high light levels and visibility into the heart of a building well established. Such fire-resistant glass is also adaptable and can offer a range of other benefits. These benefits include safety, security and good sound insulation, which in particular might be underestimated. Equally, the inadequate fire resistance of standard plastic laminate layers used, for example, for impact safety, security and acoustic performances, tends not to be fully appreciated.

Fire resistance – integrity

Resistance against fire can be achieved on two levels. The first is integrity performance which requires a resilient and robust barrier against flames and hot gases. Integrity performance, however, has no specific requirement in terms of keeping back the heat of a fire, which can be intense and unpredictable in modern interiors with synthetic plastic fixtures, fittings and furnishings.

Smoke generation on the non-fire side can also be a major threat to the safety of occupants as they exit the building, since smoke build-up can rapidly lead to difficult escape conditions. The sensitivity of the barrier to heat and flames therefore needs to be carefully checked to minimise the risk of smoke from the barrier itself (especially if an organic interlayer used within a glazed structure is unprotected and runs the risk of becoming exposed directly to fire).

Fire resistance – insulation

The second and higher level of fire resistance is the insulation class which requires the temperature rise on the protected surface of a test panel to be within the prescribed limits of a maximum individual

# of fire-resistant

reading of 180°C, and an overall average no greater than 140°C. The purpose of an insulation fire barrier is to hold back both the fire and its heat transmitted by all possible transfer mechanisms. Insulation is therefore particularly important for protection under developed fire conditions where there is especially a risk to life and a threat to the building and contents.

A very effective and capable technology to achieve both integrity and high levels of insulation is based on a special intumescent glassy layer in a sandwich structure between standard annealed glass panes. In the event of fire, the interlayer reacts and foams, expanding to produce a stable insulating layer that provides protection against the heat of the fire. The layer turns opaque to block out the fire. In all other respects, the fire-resistant glass appears and functions as standard glazing.

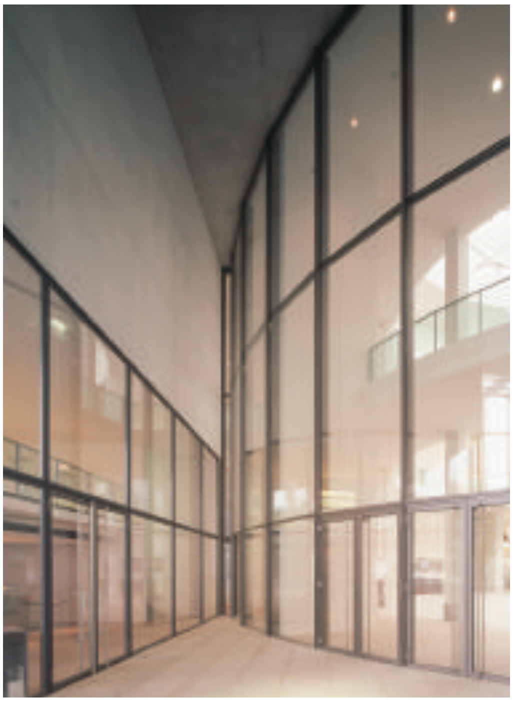
Both full insulation and integrity can be achieved with this intumescent technology. The insulation capability is high over a wide range of classification test times (from 15 minutes up to 180 minutes), and test approvals cover a wide variety of different framing systems and applications. The laminated make up of the intumescent fire-resistant glass coincidentally provides other desirable properties, in particular good noise reduction – a tremendous spin-off benefit for a product which is used throughout a building's interior.

Providing sound insulation

The easiest way to increase sound reduction is by increasing glass mass, i.e. thickness. For example, a 10mm single pane has an R_w attenuation index of 36dB compared with only 31dB for a 4mm pane and 32dB for a 6mm pane.

But sound insulation is not necessarily a question of simply increasing thickness. Introducing a certain degree of asymmetry into the make up of the glazing by combining glass panes of different thicknesses is preferable to the use of two panes of the same thickness. For example, a double glazed unit composed of two 6mm glass layers with a 12mm separating air gap (written as 6/12/6) has a R_w value of 33 dB but a thinner 6/12/4 unit, using 6mm with 4mm glass, has a better insulation value of 34dB. In the example of the two 6mm panes the resonant frequencies of the two panes reinforce each other causing a dip in the sound insulation at that frequency. Improvements in sound performance can be developed by changing the relative thicknesses of the combined panes to minimise the coincidence of resonant frequencies.

Sound insulation performance can also be improved by combining glass in a laminated structure with a plastic interlayer to produce a damping effect, such as polyvinyl butyral (pvb) or special acoustic laminate foils. A standard 6.4mm glass laminate with pvb, for example, provides a R_w value of 32dB, a 6.8mm thick glass laminate with a special acoustic interlayer (such as Pilkington **Optiphon**™) provides an improved index of 35dB. Increasing the thickness of Pilkington **Optiphon**™ readily produces further benefits (e.g. 12.8mm, R_w 39dB).



Comparing acoustic performance

Extreme care needs to be taken in comparing declared acoustic indices for different products, and especially in making assumptions regarding acoustic performance. Estimates may be used in place of measurements, and each measurement has an expected variation from result to result, like all measurements of physical parameters.

It is advisable to use indices measured and recorded on the same basis; preferable to compare acoustic performance as a spectrum over the sound frequency range; and sensible to ask for an applicable acoustic test report in the same way that a fire test report should be requested to confirm a fire resistance classification . It is also useful to remember that a difference of 3dB in noise levels is required to produce a sufficiently noticeable difference for the human ear.

Table 1: Summary

Function	Glass
Impact safety	Pilkington Optilam™
Impact safety & sound insulation	Pilkington Optiphon™
Impact safety, sound insulation & fire resistance	Pilkington Pyrodur™ & Pilkington Pyrostop™

Table 2: Example comparison of sound insulation performance for different glass products

Products not classified for fire resistance	Sound attenuation index R_w (C; C_{tr}), reference EN ISO 717-1, in dB
Pilkington Optilam™ (6.4mm standard laminate)	32 (–1; –3)
Pilkington Optiphon™ (6.8mm acoustic laminate)	35 (–1; –3)
Pilkington Optiphon™ 6.8mm in dgu, 16mm gap	38 (–2; –6)
Pilkington Optiphon™ 9mm in dgu, 16mm gap	39 (–2; –6)
Products classified for fire resistance Integrity fire resistance	**Sound attenuation index R_w (C; C_{tr}) index, reference EN ISO 717–1, in dB**
Pilkington Pyrodur™ Plus (7mm, E/EW 30, EI 15)	35 (–1; –3)
Pilkington Pyrodur™ (10mm, E/EW 30, EI 15)	36 (–1; –2)
Pilkington Pyrodur™ 10mm in dgu, 12mm air gap	38 (–2; –5)
Pilkington Pyrodur™ (13mm, E/EW 60, EI 15)	38 (–1; –2)
Products classified for fire resistance Insulation with integrity fire resistance	**Sound attenuation index R_w (C; C_{tr}), reference EN ISO 717–1, in dB**
Pilkington Pyrostop™ (15mm, EI 30)	38 (–1; –2)
Pilkington Pyrostop™ (18mm, EI 30)	38 (0; –2)
Pilkington Pyrostop™ 18mm in dgu, 12mm air gap	40 (–1; –5)
Pilkington Pyrostop™ (23mm, EI 60)	40 (–1; –3)
Pilkington Pyrostop™ 18mm in dgu with Pilkington Optiphon™ (9mm), air gap 12mm	45 (–1; –5)

Notes:

1. Further guidance and data available on request. Sound insulation data measured in accordance with BS EN ISO 140-3
2. Correction factors C and C_{tr} take into account the different frequency spectra of residential and traffic noises, respectively.
3. "dgu" refers to a double glazed unit with a 6mm float glass pane unless otherwise indicated
4. Fire resistance classifications in accordance with BS EN 13501-2: E = integrity; EW = integrity and radiant heat; EI = insulation performance; 30, 60 etc = classification test time in minutes
5. The Pilkington **Pyrodur™** and Pilkington **Pyrostop™** range are also classified for impact safety according to BS EN 12600

Combining fire and sound insulation

Plastic organic interlayers have no significant practical resistance against fire. On their own they may actually be at risk of burning. Thermal deterioration of organic layers becomes increasingly rapid from about 150°C. Such interlayers readily smoke, melt and flame when exposed to flames and heat from a fire. "Safety" as used to describe laminates based on polyvinylbutyral (pvb), and like materials, refers to impact safety. This should not be taken to mean safety in case of fire. Similarly, security laminates are primarily intended to prevent unlawful break in and they should not be taken to imply security from the effects of fire.

The intumescent interlayer used in fire-resistant glass such as Pilkington **Pyrodur**™ (integrity) and Pilkington **Pyrostop**™ (integrity with insulation), however, is a different interlayer. The interlayer is glassy and inorganic, specifically designed for robust fire resistance.

The acoustic benefits of the fire-resistant glass range based on this glassy intumescent interlayer derive from the thickness, asymmetric and damping effects that are known to improve glass performance for sound. These fire-resistant glass laminates have good sound attenuation performance as a result. Installing glazed panels of Pilkington **Pyrostop**™ and Pilkington **Pyrodur**™ in fire doors, primarily for fire performance and through vision, can also improve the overall sound insulation performance of the doors.

Fire-resistant glass floors

The striking advantages of intumescent fire-resistant glass are demonstrated by the latest developments in fire-resistant load bearing glass floors. A robust fire performance and very effective acoustic properties result from the multi-laminated structure of different glass layers combined in one structural unit.

Such an innovative development produced by Glazeguard in the UK is based on Pilkington **Pyrostop**™ for its fire resistance component. The Glazeguard floor has recently exceeded 60 minutes in an official fire test as a timber floor system under load, having also previously achieved stable fire performance and 60 minute classification in steel framing (tested to EN 1365:2000, part 2). The sound insulation R_w index for this glazed floor structure is 48 (–1; –5), reference EN ISO 717. This is a remarkable result and one that conclusively demonstrates both the robust fire protection and the effective acoustic contribution of the intumescent fire-resistant glass technology.

Structural stability of glass floors

It is a critical requirement for a fire-resistant fire floor that the load is capable of being sustained

with stability under fire conditions. Glass floors need particular evaluation since glass is substantially transparent to heat. Glass floor structures also depend on the use of toughened glass layers and laminates which are based on organic bonding interlayers. These interlayers are sensitive to heat which may be transmitted into the structure in case of fire. They deteriorate rapidly under heating, starting with liquid formation and destruction of the bonding to adjacent glass layers.

The make up of the floor system therefore has to guard against the possibility of heat transfer into the structure of the floor itself. The glass floor therefore typically requires the use of a fire-resistant interlayer with an insulation performance to restrict the possibility of heat transfer into the glass floor structure. Un-insulated basic integrity fire-resistant glass, on the other hand, would risk structural instability under load and fire exposure because of the possibility of heat transfer into the structure.

The loadbearing capability of the floor should be demonstrated by fire testing under load. The applicable test standard in the European Community is EN 1365:2000, part 2, Fire resistance tests for loadbearing elements: floors and roofs, subject to loads determined in accordance with EN 1363-1.

Integrated design

Fire safety design depends fundamentally on the provision of protected escape routes and fire-resistant compartments to contain fire, limiting the possibility of fire growth and spread.

But fire protection is not the only requirement. The internal environment is very much under pressure as occupier densities continue to rise and as owners look to squeeze the maximum value from their buildings. Multiple occupancy has become the norm, combining residential with commercial and leisure activities in the same building. The design task has accordingly become more challenging in seeking to achieve a balance between several potentially conflicting functional objectives.

Looking to the future

Fire safety design cannot be considered in isolation. It has to be achieved within the overall context of the building occupancy and the required internal environment, without compromising on architectural style and function. There is a range of functional objectives to be met: comfort, energy efficiency, natural lighting, visibility, crowd and impact safety, openness (without sacrificing security) and sound insulation are all important. Therefore, flexibility and adaptability in design are both key requirements.

Fire protection is also becoming more important and more difficult to achieve: tall, complex and congested buildings set particular challenges for safe escape and access by firefighters; and the high capital and utility value of today's buildings places a premium on resilient fire protection to protect the building during what could be extended periods of intense fire exposure.

Satisfying these fire safety demands together with other architectural requirements means that high performance insulation fire-resistant glass has a major and expanding role to play in the total fire protection package. Its adaptability and performance range means that it can undoubtedly contribute to the development of effective practical buildings. As a result, fire safety can advance without forced compromises on both highly functional and distinctively stylish design. IFP

Fire Resistant Glass Solutions

Sounder Warnings

Since the dawn of time, geographical, social and cultural developments have moulded the way society has had to grow and be governed. Every item and every law that we encounter each day has matured from what may have once been considered as an insignificant passing comment. Fire safety, a some what essential part to human survival, is in no way an exception to this. 1066 saw the first documented reference to fire safety in England by William the Conqueror where he instructed his soldiers to cover and damp down campfires before retiring to bed in a bid to avoid embers being blown into tents. This school of thought spread and, when cities started developing, being filled with wooden thatched houses, became a necessary precaution.

By Charlotte Philo

of Cranford Controls Ltd

Over time major advances in fire safety began to blossom, the 15th and 16th centuries introduced the first Acts of Parliament relating to fire, and the first automatic electric fire alarm was invented by Francis Robbins Upton and Fernando J. Dibble in 1890, a major break through.

Developments through-out time have meant that there is now an extensive range of fire safety products available to the public including sounders, beacons, door retainers, call points and items for hazardous areas. The versatility of these products ensures all requirements are catered for within various facilities, be it land based, off shore or ships. Owners of any structure are those who are responsible for ensuring that the fire code is kept up to date and abided by; this is typically enforced by fire officers and fire departments, but is force-able by law also.

Installing an alerting method in any structure is an absolute essential; options vary from audible alerting to visual alerting to tactile stimulation, with assorted choices in each spectrum.

The most common installation choice is an audible alert, most commonly referred to as a sounder. It is, however, advisable to bear in mind that both visual alert and tactile stimulation will help maintain a compliancy with the Disability Discrimination Act, which was first published in 1995, became law on 17th May 1996 and was updated in 2005.

Sounders are available in various styles including voice sounders, platform sounders, sounder beacons and standard sounders. These all function in the same way, with the same desired effect, but their varying form of alerting methods makes them unique to each other.

Voice sounders are ideal if it is crucial to give

Installing an alerting method in any structure is an absolute essential; options vary from audible alerting to visual alerting to tactile stimulation, with assorted choices in each spectrum.

out specific instructions. The model voice sounder is obtainable with various phrases for the end user to select from; these should vary to cover diverse emergencies and an assortment of facilities. A reputable voice sounder will also come complete with an alarm tone that precedes each message to alert persons within the facility to the up-coming message.

A platform sounder, also known as a base sounder, was a much needed expansion to the standard sounder. These are required within facilities where smoke detectors are intended for use, without a platform sounder no alert would sound upon the sensoring of smoke, rendering the smoke detector surplus without one. A well designed platform/ base sounder can be used, with the aid of a cover plate, as a presentable, aesthetically pleasing stand alone sounder and is

stylised to be compatible with all leading brands of conventional smoke detectors.

As I have previously mentioned visual alerts aid with DDA compliancy which is an important factor to why beacons are also an essential fire alert form but this then highlights how will the visually impaired know of a problem? This is why sounder beacons have proved themselves to be an ever growing, huge success; due to its combination the product alerts both the visually and the audibly impaired, ensuring that no-one is left at risk. Sounder beacons are typically available with a range of various lens colour options, and the sounder quality and output should be equal to that of standard sounder.

Regulations specify that a minimum of 65dB is given out by any sounder in a general area with an addition of an extra 5dB above any further background noise.

Standard sounders are the most common to any facility. Most come with a vast number of different tones for the end user to select from and typically run of 12 or 24 Volts, but are also obtainable to run off mains voltage. A recommendable sounder is one that can be quickly installed, locked into place, features a switch to select volume output and tone selection and has the ability to be over-ridden by a second stage alarm.

With the function of a sounder being to alert people to a problem, in essence saving lives, it is essential to ensure that all fire safety equipment is installed correctly; Design, Installation, Commissioning, Verification, Acceptance, Alteration and Test are all the certificates fire alarm installation requires.

Regulations specify that a minimum of 65dB is given out by any sounder in a general area with an addition of an extra 5dB above any further background noise. In a facility where people will be sleeping a sounder is required within each allocated sleeping room, situated at the bed head, sounding

a minimum of 75dB to awake any sleeping occupants. Door absorption should also be considered when affixing sounders; about a loss of 30dB should be taken into account. Installers should also take into consideration that the selected sounders should all sound similar, in a bid to avoid any confusion when hearing each different sounder.

With an ever growing emphasis on just how important fire safety is has meant that we have seen several Codes, Practices, Standards and pieces of Legislation come into force over the years, with each new one covering specks of grey area that their predecessors have missed. Some of the most essential Acts and Orders include the Fire Precautions Act which deals with general fire precautions such as fire safety training for staff, means of detecting and alerting to a fire, ways to escape and means of fire fighting. Although this Legislation came about in 1971 it lays the entire major and important ground work for fire safety so remains a well documented Act.

BS5839, an Act which is commonly referred to and quoted, was established in 1988 specifying system guidelines, it was then updated in 2002 to show testing and maintenance requirements of a fire safety system to ensure it provides the best possible performance.

2005 saw the Fire Safety Order published, it then became law on 1st October 2006. The FSO calls for the obligation of risk assessments to fall on individuals within certain categories of premises and for them to report their findings back to their local fire authority. When purchasing a sounder it is also advisable to check that it is EN54 approved and RoSH and Weee compliant.

Fire testing within any facility is an absolute essential to make sure that your fire safety system is performing to its optimal level and meeting applicable legislation. If you do not carry out regular checks a problem could go undetected and, in the case of a fire, it could end up putting people's lives at risk. Once any problems or concerns have been highlighted it is down to the building owner to ensure that the issues are seen to and promptly fixed.

With such a vast range of products on the market, suitable for all types of facilities and extensive documentation on requirements it is now so easy and essential to ensure that all persons within a building are in a safe atmosphere and protected to the building owners best extent.

Fire safety is such an important issue that should be well thought out and accounted for in every building. With such a vast range of products on the market, suitable for all types of facilities and extensive documentation on requirements it is now so easy and essential to ensure that all persons within a building are in a safe atmosphere and protected to the building owners best extent.

For further information on the products mentioned in this article and information on additional products to help fully equip your fire safety system please contact Cranford Controls on 01420 592 444. IFP

AFFF Industry in Position to Exceed Environmental Goals

With the recent announcements by major fluorochemical manufacturers of new short-chain, C6 (six fluorinated carbons) fluorotelomer-based products, the AFFF industry is in position to exceed the goals of the EPA global stewardship program.

By Tom Cortina

FFFC

and Stephen Korzeniowski

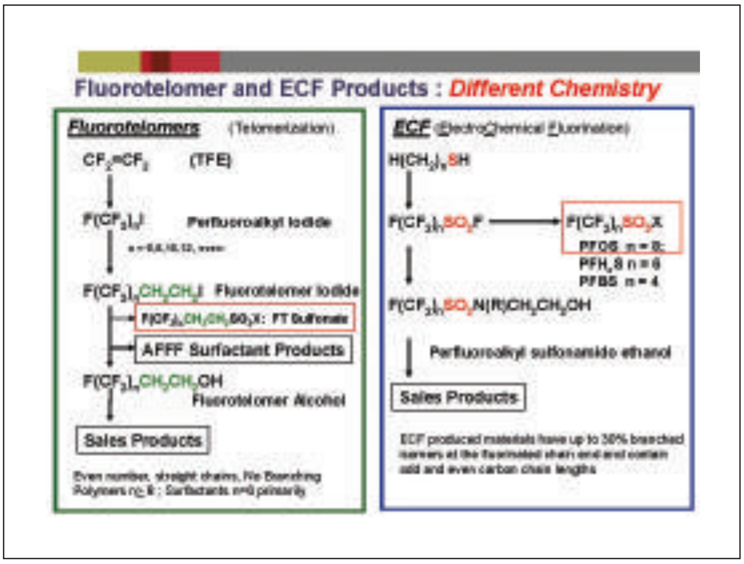
DuPont

This program has the goal to work toward the elimination of PFOA and related higher homologue chemicals from products such as AFFF and from plant emissions by 2015. This is an important set of milestones considering that since the announcement in 2000 by 3M of environmental concerns related to the use of PFOS-based products including foams, the AFFF industry has worked to address these issues in a responsible manner. Evidence of this can be seen in the smooth transition from PFOS-based to fluorotelomer-based foams, the formation of the Fire Fighting Foam Coalition (FFFC) as a focal point for cooperation with regulatory authorities, and the industry's recent focus on the containment and treatment of foam discharges. When the PFOS issue first became public there was speculation that environmental concerns could eventually lead to a ban on the production of fluorosurfactant-based fire fighting foams. Now it appears that the foam industry will be able to exceed its environmental goals with C6 fluorotelomer-based fluorosurfactants that provide the same fire protection characteristics but with reduced environmental impacts.

Fluorosurfactants are a key ingredient

Historically, most of the environmental concern related to fire fighting foams has focused on aquatic toxicity and residual foaming, which can be a concern for local waterways and sewage treatment systems, and are common problems for all foams[1]. Over the past 10 years the focus has shifted

Figure 1. Fluorotelomer-based and PFOS-based Chemistry



to the fluorinated surfactants (fluorosurfactants) that are a key ingredient in aqueous film-forming foams (AFFF). Fluorosurfactants provide AFFF agents with the required low surface tension and positive spreading coefficient that enables film formation on top of lighter fuels. It is this film formation capability that gives AFFF its name and its effectiveness against flammable liquid fires.

3M used a unique process to manufacture the fluorinated components of the fluorosurfactants contained in its AFFF formulations. The process is called electrochemical fluorination (ECF), and fluorosurfactants produced by this process both contain and degrade into a chemical known as PFOS (perfluorooctyl sulfonate). Other competitive manufacturers use a process called telomerization to produce the chemical components of the fluorosurfactants contained in AFFF agents. Chemicals produced by this process are generally referred to as fluorotelomers.

Over the past several years there has been a substantial shift from PFOS-based AFFF agents to equally or more effective AFFF agents containing fluorotelomer-based fluorosurfactants (see Figure 1). With the withdrawal of the PFOS-based products due to their persistence, bioaccumulative and toxic properties (beginning in May 2000) and their subsequent regulation by various national governments, makers of fluorotelomer-based products began more intensive study of the toxicology and environmental fate of their products.

Environmental impacts of fluorosurfactants

A primary debate about fluorotelomer-based products centers on the perceived similarity to PFOS, the presence and/or generation of perfluorocarboxylic acids (PFCAs) such as perfluorooctanoic acid (PFOA), and the ultimate breakdown products of these surfactants.

First and foremost, fluorotelomer-based AFFF agents do not contain or degrade to PFOS, and contain 30-60% less fluorine than PFOS-based AFFF. They are not made with PFOA or PFCAs. The predominant breakdown product from the six-perfluorinated carbon (C6) based fluorotelomer surfactants is commonly referred to as the 6:2 fluorotelomer sulfonate (6:2 FtS)[2]. They may also contain trace levels of PFOA and the C6 acid, perfluorohexanoic acid (PFHxA). The highlighted red box on the left side of Figure 1 calls out the 6:2 FtS structure (where n = 6). Although there have been numerous articles and conference presentations that purport the 6:2 FtS to be a PFOS analog (sometimes incorrectly referred to as H-PFOS), the scientific data do not support this allegation. The physical, chemical, biopersistence and toxicological properties of 6:2 FtS are not similar to PFOS.

Toxicology

A second part of the debate seems to focus on the potential hazards of PFHxA and the 6:2 FtS. These two compounds can be both contaminants in the final products as well as potential degradants once the AFFF agents are used. Extensive data on PFHxA were presented at a US Environmental Protection Agency (EPA) PFOA Information Forum in June 2006 that gave a very favorable initial toxicology (hazard) profile[3]. Additional information was presented in September 2007 at a major foam conference in the UK (Reebok) that further supported the favorable toxicology profile of PFHxA[4]. Preliminary data were shared on four major toxicology end points: subchronic toxicity in rats, reproductive toxicity in rats, developmental toxicity in rats, and genetic toxicity. It was noted at this conference that PFHxA was neither a selective reproductive nor a selective developmental toxicant. In addition it was clearly shown to be neither genotoxic nor mutagenic. Combining these data with those presented in June 2006 provides significant evidence that this particular end product has a low hazard profile based on current data.

Based on recent groundwater studies, the 6:2 FtS has been shown to be the likely ultimate degradation product of the C6 fluorotelomer-based surfactants used in today's AFFF agents. The screening study cited above (Figure 2) indicated that the 6:2 FtS had a low relative biopersistence potential. The 6:2 FtS had a high NOEC (no observed effect concentration, the higher the NOEC the lower the concern for toxicity) in the 90-day early life stage trout study. Results presented at the Reebok foam conference provided preliminary new results on environmental effects as well as bioconcentration (BCF) and bioaccumulation (BAF) in rainbow trout. Although the data were preliminary in nature, the results were clear and compelling. Moreover both the BCF and the BAF values suggest low concern for bioaccumulation from water or diet. The data strongly suggested that 6:2 FtS is not bioaccumulative according to published regulatory criteria and affirmed that it does not behave like PFOS.

Biopersistence

The results of a 6:2 FtS biopersistence screening study were also presented at the Reebok foam conference. The data presented are shown in Figure 2 (publication in preparation). This screen-

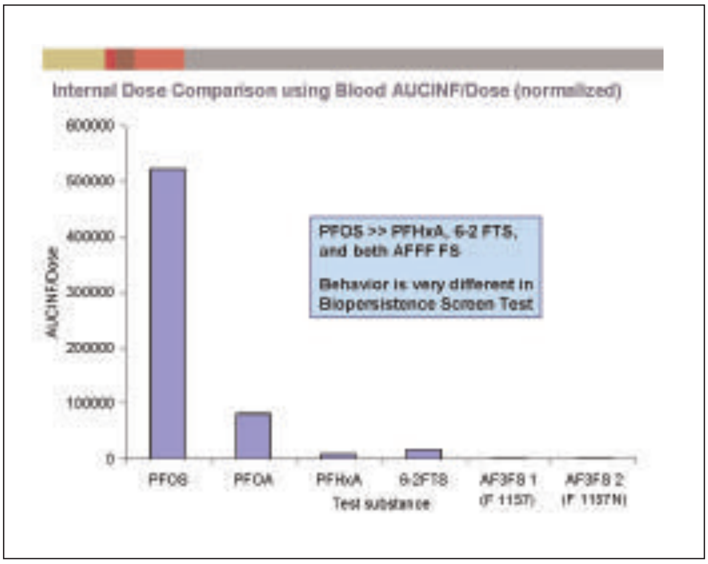


Figure 2. Biopersistence Screening Study Results

ing study involves oral dosing of male rats for 10 days followed by an 84-day recovery period. The study determined total organic fluorine levels in plasma, liver, and fat. It provides a screening measure of what toxicologists refer to as biouptake and bioclearance. The AUCINF, or area under the curve integrated to infinity, provides a relative integrated measure of the absorbed dose of the compound studied. A compound that is absorbed and quickly eliminated or is simply not absorbed will have a low relative AUCINF. It is very clear from Figure 2 that the 6:2 FtS, the C6 acid (PFHxA), and the two commercial fluorotelomer-based fire fighting surfactants have extremely low values when compared to PFOS. In this study, PFOA is also lower when compared to PFOS.

PFOA global stewardship program

Although they are not made with PFCAs, fluorotelomer-based fluorosurfactants may contain trace levels of PFOA. Fluorotelomer producers are working toward the elimination of trace levels of PFOA, PFOA precursors, and related higher homologue chemicals from finished products by 2015 as part of the US EPA global stewardship program. Under the program, EPA asked fluorotelomer producers to make two commitments:

- Reduce by 95% by 2010 (based on a 2000 year baseline) facility emissions and product content levels of PFOA, precursor chemicals that can break down to PFOA, and related higher homologue chemicals.
- Commit to working towards elimination of PFOA, precursor chemicals that can break down to PFOA, and related higher homologue chemicals from emissions and products by 2015.

The recent announcements by fluorochemical

manufacturers of the introduction of short-chain fluorotelomer products means that the AFFF industry is in position to meet the EPA goal well in advance of the 2015 target date.

Fire Fighting Foam Coalition

In May 2001, AFFF and fluorosurfactant manufacturers met in Washington DC with representatives of the US EPA, the US military, and major foam users to discuss the

fallout from 3M's decision to stop production of PFOS-based AFFF due to environmental concerns. It quickly became clear that users and agency staff did not fully understand the differences in chemistry between PFOS-based and fluorotelomer-based AFFF agents. It was also evident that speculation about the future regulation of AFFF agents was causing problems for the industry. As a result of this meeting, the Fire Fighting Foam Coalition (FFFC) was formed to ensure that accurate information about fluorotelomer-based AFFF agents is disseminated to appropriate audiences.

FFFC is a non-profit corporation that represents the AFFF industry's interests on all issues related to the environmental acceptability of fire fighting foams. The coalition provides a focal point for industry technical reviews, development of industry positions, and interactions with the EPA and other relevant organizations. Members of are AFFF manufacturers, fluorosurfactant manufacturers, and distributors.

FFFC has provided extensive information on AFFF to environmental agencies in the US, Europe, and Canada that includes the following:

- Amount of fluorosurfactant actives used in the manufacture of AFFF in the US
- Chemical structure of the fluorosurfactants used in major fluorotelomer-based AFFF formulations
- Mechanics of film formation
- Groundwater monitoring data from US military fire training areas
- U.S. Inventory of PFOS-based and fluorotelomer-based AFFF
- Overview of the different types of foams, the market channel for their distribution, and the environmental fate once they are used
- Aquatic toxicity of fire fighting foams

Existing stocks of PFOS foams

Although production of PFOS-based foams ended in 2002, significant stocks of PFOS-based foams are still in service in many industries throughout the world. A study by Hughes Associates of AFFF inventories in the US showed that there were 4.5 million gallons of PFOS-based AFFF concentrate in stock in 2004[5]. While US regulations do not restrict the use of these stocks, regulations in Europe and Canada would ban the useof existing stocks of PFOS-based foams within 3-5 years.

A European Union directive on PFOS was published in December 2006 that requires existing stocks of PFOS-based foams to be removed from service by June 27, 2011. To facilitate tracking and adherence to the directive, EU member states must provide the European Commission with an inventory of existing stocks of PFOS-based foam agents by December 27, 2008.

A proposed regulation was published by Environment Canada in December 2006 that would requires existing stocks of PFOS-based AFFF to be removed from service 5 years after the regulation comes into force. During the 5-year exemption period, those stocks could not be used

for testing or training purposes. (In other words, they could only be used to extinguish emergency fires.) The final regulation should be published this year, which means that the restrictions on PFOS foams would begin in 2013 or 2014.

Fluorine-free foams

As a result of the concerns raised by the PFOS issue, foam manufacturers continue to evaluate many types of potential products that do not contain fluorosurfactants, but efforts to date have not yielded working products with fire performance across all fuels and in all operational circumstances equal to film-forming foams. Some fluorine-free foams can provide an alternative to AFFF in some applications, but they are not currently able to provide the same level of fire suppression capability, flexibility, scope of usage, and independent validation. A recent paper from the University of Newcastle that shows that even the best available fluorine-free foam would need to be replenished three times as often as AFFF to provide the same level of fire protection[6].

Fluorine-free foams are often championed as "environmentally-friendly" alternatives to AFFF. Although such foams may not contain fluorine, their environmental profile related to biodegradation, acute toxicity, chemical oxygen demand (COD), and biochemical oxygen demand (BOD) is typically no better than fluorine-containing products and in many cases is not as environmentally responsible in use as AFFF. A recent study of commercially available fire fighting foam agents indicates that fluorine-free foams are at least an order of magnitude higher in aquatic toxicity than AFFF agents[7].

FFFC assists in wastewater treatment

Another issue that has been brought to the forefront in recent years is the containment and treatment of wastewater from foam discharges. FFFC and its member companies have been actively involved in this issue, and recently provided assistance to an oil refinery in Missouri that was looking for help in dealing with a wastewater disposal issue. The company had a fire at a bulk plant that resulted in 1.1 million gallons of wastewater containing gasoline, diesel fuel, and fire fighting foam agents used to extinguish the fire.

FFFC put the company in touch with one its members, Martial Pabon of DuPont, who had done research on the use of activated carbon to treat water that contained fluorosurfactants similar to those used in AFFF. Based in part on the information provided by Dr. Pabon, the company successfully treated 1.1 million gallons of wastewater in 15 days using granular activated carbon (GAC) in a trailer-mounted system with two pressure vessels each containing 5,000 pounds of GAC[8]. Dr. Pabon has done additional research on other methods to treat wastewater, including nanofiltration, ultrafilitration, and reverse osmosis[9].

Conclusions

Fluorotelomer-based AFFF agents are the most effective agents currently available to fight flammable liquid fires in military, industrial, and municipal settings. They do not

contain or breakdown into PFOS and are not likely to be significant sources of PFCAs. They do contain fluorosurfactants that are persistent, but are not generally considered to be significant environmental toxins. AFFF and fluorosurfactant manufacturers are in position to meet the goals of the EPA global stewardship program years ahead of the target date with a new family of fluorosurfactants that provide the same fire protection characteristics with reduced environmental impacts. IFP

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With the inevitable complete phase-out of halon 1301, the search for a direct replacement has eluded the fire protection industry until now. In the past decade several companies have offered acceptable solutions that meet the requirements of zero ozone depletion, life safety, and the protection of high value property. However, most chemical alternatives have long atmospheric life time and high global warming potential, two key characteristics suspected as contributing to the warming of the planet.

By Jon Flamm

Product Manager,
SEVO Fire Suppression Systems

FK-5-1-12 (trade name 3M™ Novec™ 1230 Fire Protection Fluid), as referred to in the international fire protection standards NFPA 2001 and ISO 14520, is rapidly becoming the preferred replacement for halon 1301 in end use applications due to it having a remarkably low global warming potential of one, along with an atmospheric lifetime of only five days while maintaining a zero ozone depletion potential and superior life safety characteristics.

All approved fire protection equipment manufacturers of total flooding systems using FK-5-1-12 have employed, as standard, cylinder storage pressures of 25 bar (360 psig) and/or 42 bar (600 psig). All halon 1301 replacement systems require additional low pressure welded cylinders or high pressure spun steel cylinders along with all new piping, not allowing for a direct replacement. The development of the SEVO Systems' 34.5 bar (500 psig) hardware designed for use with

FK-5-1-12 provides for the first time the possibility of a 1 to 1 cylinder replacement, in addition to utilizing the previously installed piping.

Preliminary testing and now, firsthand experience with existing installations around the world, has proven that a SEVO 1230, FM approved, increased pressure system, can replace a conventional 25 bar (360 psig) halon 1301 system by only replacing the nozzles, the cylinder and the agent. By increasing the storage pressure in the cylinder, the system using FK-5-1-12 allows for additional pressure to reuse existing halon 1301 piping while achieving the required minimum nozzle pressures.

The following examples show four (4) halon 1301 systems, engineered at 25 bar (360 psig), 10.0 second discharge time, with an average nozzle pressure of 4.5-7.6 bar (60-110 psig) that can be successfully replaced with the SEVO 1230 "One for One" retrofit system. Each application was designed for replacement with a SEVO 1230 increased pressure system while utilizing the existing halon piping. The halon 1301 cylinders were replaced 1 to 1 with SEVO 1230 cylinders filled with FK-5-1-12 (Novec 1230 fluid), requiring only new SEVO 1230 nozzles to achieve the approval requirements and the minimum required nozzle pressure.

Innovative delivery system

Since the developed countries' 1993 manufacturing phase out of substances that deplete the ozone layer per the Montreal Protocol, there has been, and continues to be, an effort to develop a direct 1 for 1 replacement for systems using halon 1301 (bromotrifluoromethane). Fire protection equipment manufacturers offer alternate technologies using hydrofluorocarbons (HFCs) or inert gases to replace previously protected hazards by halon 1301. Some of these companies, along with SEVO Systems, offer systems using FK-5-1-12 (Novec 1230 fluid) at either 360 psig or 600 psig. These new clean fire extinguishing agents require higher design concentrations and thus greater agent mass quantities to achieve comparable fire extinguishing performance to that of halon when used in total flooding applications. This requires that the design of a fire suppression system must allow for larger quantities of agent than the initial halon 1301 equipment provided. The storage cylinders require larger capacity and in the past, more cylinders. Substantial revisions to the delivery systems, nozzles and pipe are required to deliver the increased material quantity and in many cases, at an unacceptably long discharge time of greater than 10 seconds for systems employing halocarbon agents. The higher cost to revise and replace the halon distribution systems and the additional floor space required for additional cylinders have largely prevented many halon 1301 protected applications from direct conversion.

A number of HFC clean agents have been used in standard 25 bar (360 psig) hardware to replace the halon 1301 in existing applications. These higher Global Warming materials may require longer system discharge times. The inert gases require much higher operating pressures and therefore cannot be used in existing low pressure piping networks. There are various deadlines around the world for halon 1301 removal and replacement and growing pressures to eliminate

EXAMPLES

TYPE	(1) CLASS "C"		(2) CLASS "A"		(3) CLASS "B"		(4) CLASS "A"	
Manufacturer	**Ansul**	**SEVO**	**Chemetron**	**SEVO**	**Fike**	**SEVO**	**Pyrotronics**	**SEVO**
Hazard Design	6.0%	6.0%	5.0%	4.20%	7.0%	5.85%	5.0%	4.2%
Hazard Size	5018	5018	3155	3155	7260	7260	1456	1456
Size/Fill (lbs)	200/125	322/277	65	164/120	215	601/390	30	76/56
Pipe Size (in)	2	2	1.25	1.25	2.0/1.5	2.5/2.0/1.5	1	1
Pipe Equivalent length (ft)	75	77	73	75	105	114	115	117
Nozzle Size (in)	2	2	1.25	1.5	2) 1.5	2) 1.5	1	1
Average Nozzle Pressure (psig)	124	75	125	76.4	135	75.6	140	80.9
Discharge Time(s)	7.8	8.0	7.4	8.7	8.0	8.3	9.0	9.1

(1) A Class "C" 142 m^3 (5018 ft^3) hazard protected by an Ansul™ 6% halon 1301 system. The initial system design calculations using Ansul's listed software calls for a 125 lb. filled halon 1301 cylinder using single 2" nozzle and pipe network. A design concentration of 6.0% for FK-5-1-12 fluid is used in this comparison.

(2) A Class "A" 89 m^3 (3155 ft^3) hazard protected by a Chemetron™ 5% halon 1301 system. The initial system was provided per the Beta pre-calc computer generated calculation using 65 lbs. filled halon 1301 cylinder and a 1¼" nozzle with associated pipe network. A design concentration of 4.2% for FK-5-1-12 fluid is used in this comparison.

(3) A Class "B" 205.6 m^3 (7,260 ft^3) hazard protected by a Fike™ 7% halon 1301 system. The initial system was provided in accordance with Fike's pre-engineered Halon 1301 manual with 215 lb. filled halon 1301 cylinder using a 2" pipe network and 2) 1½" nozzles. A design concentration of 5.85% for FK-5-1-12 fluid is used in this comparison.

(4) A Class "A" 41.2m^3 (1,456 ft^3) hazard protected by a Pyrotronics™ 5% system. The initial system design calculated per their approved software provided for a 30 lb. filled halon 1301 cylinder using a 1" pipe network and 1" nozzle. A design concentration of 4.2% for FK-5-1-12 fluid is used in this comparison.

the worldwide use of high global warming agents. SEVO Systems introduced the first UL Listed product line designed with FK-5-1-12 at 25 bar (360 psig). Since 2001, SEVO Systems has strived to develop a "True Retrofit" system, that is, a "One for One" cylinder replacement using existing installed halon 1301 distribution piping. This is a solution that meets four primary principles:

1 Replace agent supply with a 1 for 1 footprint,
2 Minimal distribution pipe modifications,
3 Replacement only of distribution nozzles,
4 A resultant system that meets the fire suppression performance requirements by achieving the required discharge time, minimum distribution nozzle pressure and agent distribution per current approvals, listings, and standards.

In each of the examples described above the SEVO 1230 delivery system provided for the retrofit of each manufacturer's halon 1301 equipment by replacing the agent`s cylinder and nozzle only with a minor revision of the initial pipe elevation. By increasing the pressure of the storage cylinder from 25 bar to 34.5 bar (360 psig to 500 psig) the agent flow rate is increased while maintaining the minimum required average nozzle pressure in accord with the system approval. The discharge time of 10 seconds is achieved using the existing halon 1301 distribution pipe network. More recently, major halon installations have been designed for retrofit with the SEVO 1230 "True Retrofit" System. The same results have been achieved as described above and only minimum piping distribution adjustments have been necessary.

The low vapor pressure of the FK-5-1-12 fluid can be utilized as a differentiating feature from that of any other halon replacement, by super pressurizing the agent storage cylinder with nitrogen to 34.5 bar (500 psig); a "True Retrofit" of a halon 1301 system with one using Novec 1230 fluid can be achieved.

The key innovation is the use of the standard welded 500 D.O.T/T.C low pressure cylinder. SEVO is utilizing the low vapor pressure of the Novec 1230 fluid, which allows for safe use in welded cylinders at elevated pressure to achieve the "True Retrofit".

Summary

The retrofit of existing halon 1301 total flooding system is now possible while using the existing halon pipe network. Delivering the agent quantity, achieving the design concentrations at the approved/listed nozzle pressure within the allowed discharge time of 10 seconds for FK-5-1-12 is now possible. This innovative development offers the first "One for One" halon 1301 "True Retrofit" solution. The SEVO 1230 "One for One" system allows for employing existing halon 1301 pipe networks while using the preferred second generation fluid reducing the overall cost and downtime of retrofit. IFP

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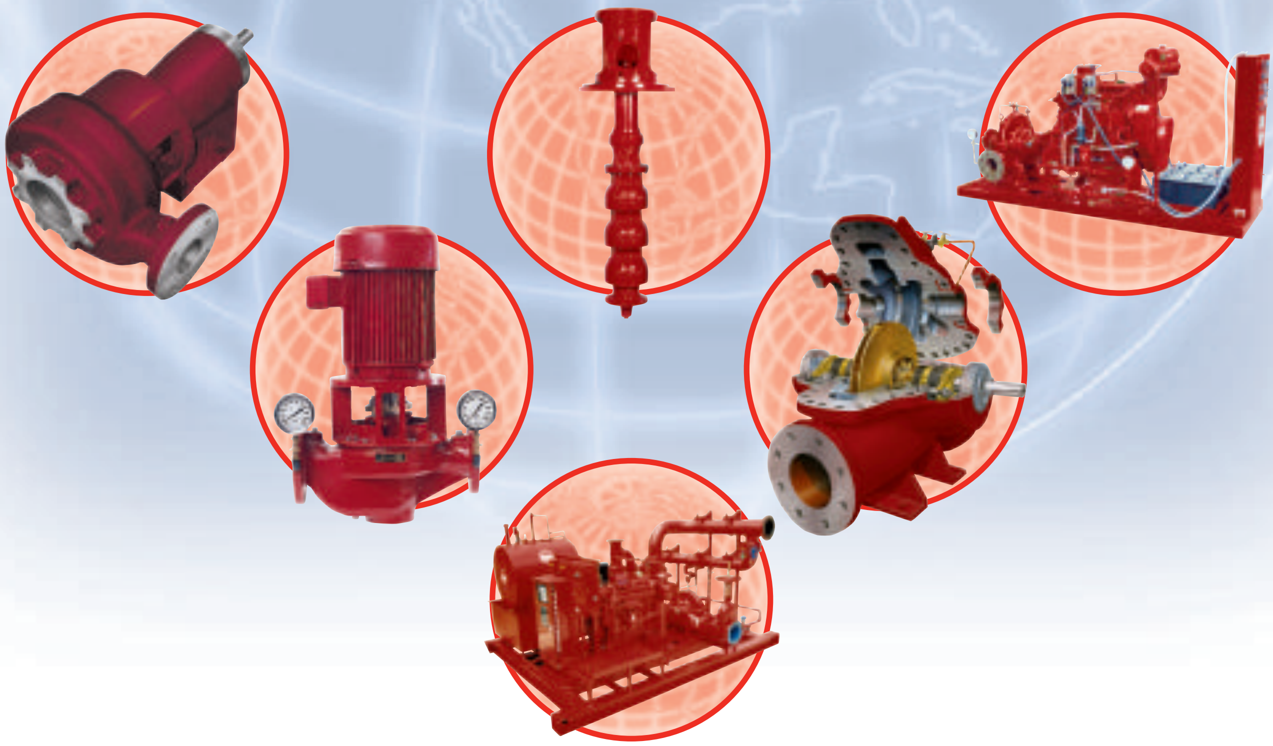

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Multi Stage/Multi Outlet pump in hi-rise building in Prague

Fire pump packages are developing to meet industry needs

As world markets advance and fire protection systems evolve to satisfy the new needs, Alex Playfair, Business Manager of Industrial Fire for SPP Pumps, expands his recent submission to BFSA to show how fire pump technology is developed to keep pace with the demands created by the changes.

By Alex Playfair

Business Manager, Industrial Fire for SPP Pumps

Over the years, sprinkler systems have proved their effectiveness and reliability in containing and extinguishing fires. From the introduction of this type of protection, a reliable water supply to the sprinkler installation has proved as critical as the sprinkler system itself. One tried and tested way of supplying water to the system is through fire pumps and water tanks.

Operation

The fire pump is automatically placed on demand by a pressure drop in the sprinkler system, when a sprinkler head is called into action. From this pressure switch signal, the pump set package controller initiates the pump driver to start, powering the pump to supply the sprinkler head. The Sprinkler Contractor determines the flow of water and pressure needed for the risk. The pump characteristic and associated equipment are selected to satisfy the individual sprinkler applications.

The two main ways of driving the fire pump are electric motor or alternatively the diesel engine. Many installations will utilise both in a duty and stand by configuration. When the site does not

End suction, close coupled type fire pump

have the capability of supporting the electric motor power supply diesels become the preferred driver. Generators are another option for supplying the power to the electric motor.

The sprinkler pumps supply water to the riser pipes of the sprinkler system. The sprinkler ranges take their supply from the riser pipes.

The pump takes its water supply from a water tank, rated to supply the system at maximum demand for 60 or 90 minutes.

The key components of the system are approved for use in a fire sprinkler system.

Pump types

The most common types of pumps used in sprinkler system water supplier are centrifugal end suction and spilt case. These pumps can transfer fluids with high efficiencies over a wide range of flows and pressures. The pumps are used in ordinary hazard risks such as schools, shops, hotels, hospitals and office premises and extra high hazard risks such as warehouses and factories.

The end suction type pump takes its water from the end of the pump and discharges at the top. The horizontal split case type takes and discharges water at the side.

The pumps can be used when the water supply is below the mounting level of the pump but the most popular way of approaching a lift situation is with vertical turbine pumps.

Fire pump packages develop to meet industry needs

As world markets advance and fire protection systems evolve to satisfy the new needs, fire pump technology is developed to keep pace with the demands created by the changes. Revised regulations are also determining the duty demands and specification requirements of fire pump packages. Combined, this results in an ever-changing scope of package supply with new pump types required and packages developed to satisfy the needs of current and future applications.

High-rise buildings

Construction of high-rise buildings is on the increase in major cities. The heights of the buildings are rising constantly as ground space becomes even more precious. If only one riser were to be installed in a high rise building then the lower sprinkler ranges would have to find a way to overcome the high pressure needed to satisfy the demands of the highest level that sprinklers are installed. High pressures

are required from the pump to supply the top levels of a high-rise building to overcome the high static distance to the highest sprinkler ranges. This means that the pressures to the lower ranges will be higher than the system components and sprinkler head can handle. Conventional installation procedures cannot be applied and the contractor has the option of fitting pressure reducing valves or zoning the area to eliminate high pressures on the lower ranges. As pressure-reducing valves are not recommended for this purpose under many fire authority rules and the rules specifically state that they should only be used for this application when absolutely necessary, zoning becomes the correct method of installation, with European EN12845 rules also insisting on a maximum zone height of 45m.

The way of meeting these requirements with an approved and listed fire pump is by utilising one single multi-stage, multi-outlet pump. This pump has outlets at various stages of the pump, which will pump up to various levels of the building through the separate risers.

ESFR installations

Developments in sprinkler head technology have increased the need for specialised fire pumps for specialist types of sprinkler heads. ESFR sprinklers were developed in the 90's to protect many commonly used storage arrangements. Formerly these applications would have been protected with in-rack sprinklers and ceiling protection but ESFR sprinklers removed the need for in-rack sprinklers and produced a solution that called for ceiling protection only. Because of the nature of this head, design principles and operating characteristics differ from conventional sprinkler protection. A technical bulletin (TB209) was developed in the Uk to enhance EN12845, that specifies the requirements and recommendations for the installation of ESFR sprinklers. TB209 lays out special requirements that are only applied when ESFR sprinklers are utilised, specifying special selection criteria for the pumps that are applied only when utilising ESFR heads.

Factory assembled packaged pump houses

Pre-assembled pump house packages are becoming commonplace with many supermarket and D.I.Y. chains insisting on factory built pump house packages. Major industrial users are also seeing the benefit of fabricating the package under factory conditions and insisting on this type of pump house construction. The package requires the pumps to be installed within a custom built housing with all the required pipework, valves, test lines, louvres, heating and lighting normally supplied in a conventional site-constructed pump house. The pre-assembled units are designed in accordance with the applicable fire rules and regulations and where necessary the applied national construction standards. With all the associated advantages, the factory assembled and tested pump house has become much more convenient to install for both the end user and contractor. The completed unit is offloaded directly on to a pre-cast plinth and the contractor simply needs to secure the unit to the plinth, provide the electric supply into the pump house and pipe in the pumps' water supply. This method of supply significantly reduces the on-site installation time of the pump house and allows the contractor to focus on other parts of the installation. IFP

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Effectively dealing with fully involved tank fires requires a scale of attack unimaginable during the 1983 Milford Haven fire

Storage Tank Fire Protection

Buncefield has become an iconic incident in the extremely limited pantheon of major UK tank fires. It joins a select band of "once in a career" fires that have the ability to change thinking amongst professionals.

By David Owen

Firemain Engineering
www.firemain.com

However, we have to go back as far as 1981 to find Europe's trigger for what we might call the new wave of tank firefighting – there was a realization that aspirated low volume foam application had serious shortcomings. Tank 80X1 at Mobil Oil, Coryton refinery was the ground breaker at that time as it brought about Europe's first realistic and thorough full surface tank fire fighting appraisal project carried out jointly by Mobil Oil, Shell UK & Essex County Fire & Rescue Service. It culminated in the development of Europe's first refinery full surface tank fire fighting procedures. Both large volume non aspirating monitors of 22,000 & 37,500 lpm were evaluated along with the first realistic practical appraisal since the 1930's of both the correct type of foams to use and the foam application rates to be effective. We saw the introduction of an application rate of 10.5 lpm/m^2 (against the previous Europe wide 6.5 lpm/m^2 norm at that time), with the largest tanks being 76 metre diameter crude oil open floating roof tanks.

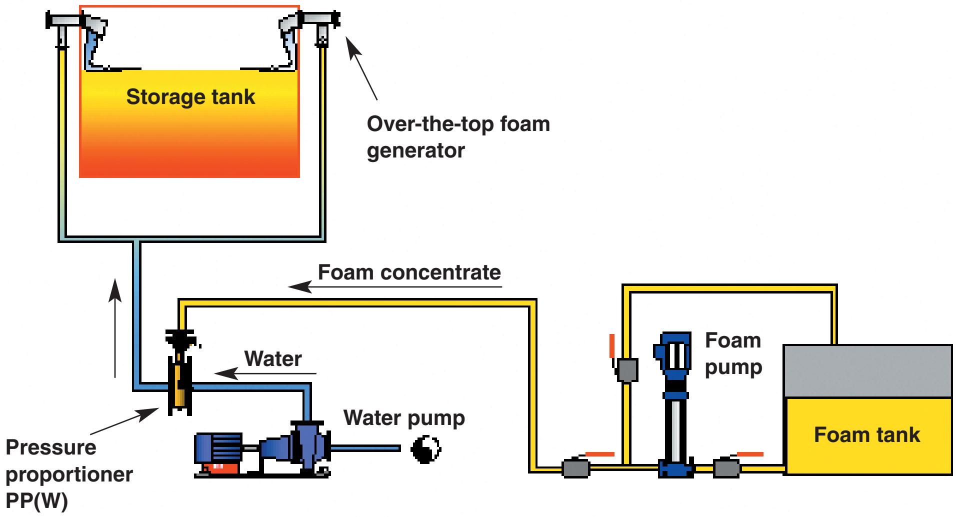
Between the Coryton and Buncefield fires, the 1983 Tank 11 fire, at the then Amoco Refinery in Milford Haven, also generated huge media interest as the second in the trilogy of major UK tank fires within many people's living memory.

Even if tank fires are rare in the UK, a significant number of fires occur annually on a worldwide basis. Given that most large tanks are of the floating roof tank variety, it follows that guidance on how to extrapolate fire protection guidelines from smaller tanks to the huge fire risks of today should be given serious consideration. With ongoing research into tank fires being coordinated through the LASTFIRE project and historical data available from media sources, this contribution will take an overview of both fixed and portable fire protection methods.

Assuming that the facility to be designed is in accordance with a Flammable and Combustible Liquids Code such as NFPA 30, and that suitable tank maintenance procedures are followed, the strategy can call upon guidelines for protection contained within NFPA 11 or IP19. Both standards cover everything from cooling spray rates through to calculating the quantity of foam concentrate to be stored and the type of foam delivery to be used. The concern is always whether the success rates of smaller scale fire tests can be replicated when faced with a real life incident and all the variables that real life presents. Equally, risk assessment should establish whether or not it is still viable to deal with one tank at a time or to take the now more widely accepted view that multiple fires can occur.

The success of fixed systems is always dependent on a good maintenance regimes, adequate stocks of foam concentrate and that tank discharge devices are not going to be knocked out by explosion.

Top pourers



The practicable options can be summarized in the following categories:

- Detection & Alarm Systems
- Detection & Fixed Suppression Systems
- Fixed Foam Pourer/Base Injection Systems
- Fixed & Mobile Foam Monitors
- External Brigade Assistance

Floating roof tanks

Detection and foam suppression stand alone units. Usually Nitrogen powered with telemetry control back to the control room. Small foam vessels are located on the roof to protect the rimseal area. The advantage of the combined detection system is its speed of response.

Over the top pourers. Provide low expansion foam to the rimseal foam dam area. Can be fed from a central foam proportioning system or from a mobile foam tender. Can be linked to linear heat detection or can be manual.

Williams Fire & Hazard Control have been carrying out considerable R&D into cone and internal floating roof tank fires, following a series of these over the last years.

It was perceived by Dwight Williams and his team that foaming the surface of the product prior to extinguishing the fires on these tanks when they are burning at the vents or fishmouth tears can over time cause an explosion inside the tank that is likely to violently blow the roof of the tank.

It was during this research that they fell upon the concept of a dual agent foam / dry chemical chamber fitted in place of one of the foam chambers if fitted to these tanks, thereby allowing

Svenska Skum semi sub surface foam injection unit

Williams Fire & Hazard dual agent foam chamber

firefighters to purge the atmosphere inside the tank vapour space during the fire and extinguishing the fire in a matter of seconds.

Cone roof tanks

Over the top pourers, protecting the full fuel surface and incorporating a vapour seal between the tank and supply pipework. Can be subject to explosion damage.

Base foam injection systems are situated remotely from the explosion area. Rely on forcing low expansion foam through the base of the tank up to the fuel surface. Unsuitable for foam destructive products.

Semi subsurface base foam injection systems incorporate a high back pressure generator and an internal floating delivery hose to apply foam to the surface of the tanks containing foam destructive chemicals such as Methanol or Acetone. A gentle foam application results in faster extinguishment. A plunging foam application is a less efficient method of delivery.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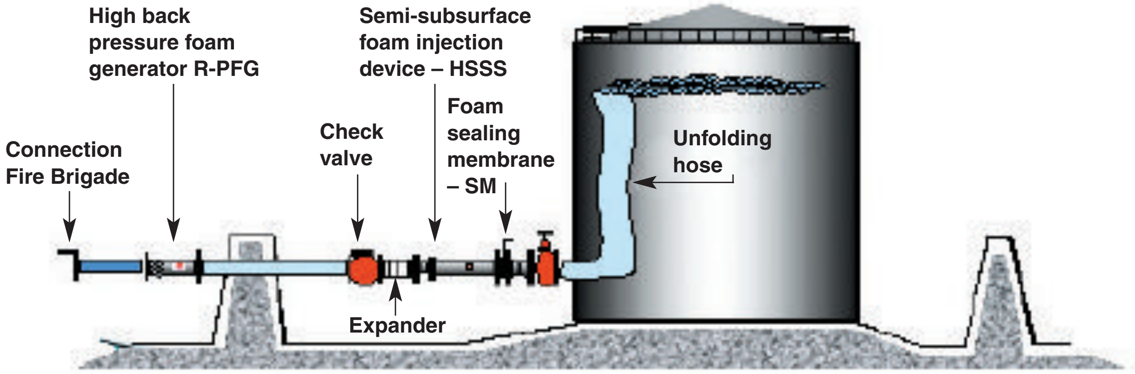

Mobile equipment such as monitor trailers and refinery vehicles with monitors, as with floating roof tanks require a critical deployment factor involving a sufficient quantity of foam concentrate and water in the correct application rate or deployment will not succeed

It is in this area that most development has taken place with the realization that fully involved tank fires can be successfully extinguished rather than left to burn. The use of unaspirated foam applied by very high flow rate monitors also represents a paradigm shift from the days of aspirated only application. The current "record" tank fire is the Orion. The incident occurred in 2001 and was successfully extinguished by a team from Williams Fire & Hazard Control in 65 minutes using an application rate of 8.55 l/m^2/min. The tank was a massive 82.4 metres diameter and it required a flow rate of 45,000 lpm. Given these big numbers it is easy to see why foam concentrates are becoming ever more concentrated with 1% taking over from 3% and 6%. This means that less product is required to be stored and transported should the worst occur.

Compare this to 1983 when tank 11 at Milford Haven was fought in two waves: firstly by applying foam at a rate of 10400 L/min (2300 imp gpm) and secondly at 14500 lpm corresponding to an application rate of 3.0L/m^2/mi. 3 canons were lifted onto the collapsed tank shell to extinguish the folded shell area.

Since then Williams Fire & Hazard have developed their Daspit tool, a monitor specially adapted to fix to the tank wall that allows firefighters to target a rimseal fire from an above ground position without risking expensive hydraulic access appliances nor unnecessary hazard to firefighters. As Dwight Williams of Williams Fire & Hazard said during one of their recent incidents:

Williams Fire & Hazard Control – Daspit monitor

"The risks here are many – but first and foremost on everyone's mind is not to sink the pan. This was a floating roof tank with a pretty good seal fire on it. You cannot allow that seal fire to jeopardize the integrity of that roof and sink it into the product. If that happens you immediately go from a 2,000 gallon per minute application to 14,000 gallons per minute!"

"We got everything into place very efficiently and knocked the fire out 20minutes after arriving! You can't accomplish that without knowledgeable and helpful teamwork."

The LASTFIRE study indicates a very low probability of full surface fires on floating roof tanks as a result of rim seal fires. However, if there is a spill fire on the roof or an impinging bund fire, the probability for a full surface increases. Due to the fact that floating roof tanks are very often large diameter tanks, they will also create one of the most challanging situations in a tank farm.

Refineries and fuel storage sites are increasingly adapting to the needs of high flow monitors and are investing in the combined infrastructure – monitors, foam stock, high flow hoses and high volume pumps – designed to deal with fully involved tank fires. The greater sharing of information on a worldwide scale through organisations such as JOIFF (Joint Oil Industry Fire Forum) is leading to a consensus that the armoury to fight these fires includes both fixed and portable equipment. Where sites are in close proximity to one another, mutual aid schemes are being developed so that the infrastructure costs can be shared. It's not surprising that this type of specialized resource is beyond the means of municipal fire brigades when we consider that they have severe budgetary restrictions and whose remit is arguably not to finance the resources for very exceptional industrial hazards. IFP

References

Thanks to Williams Fire & Hazard Control for supplying information and photographs.

LASTFIRE: The LASTFIRE Project provided an independent and comprehensive assessment of fire related risk in large, open top floating roof storage tanks resulting in a methodology by which site specific Fire Hazard Management policies can be developed and implemented. It therefore represents a major advance in the knowledge of this risk. Resource Protection International www.resprotint.co.uk

Joint Oil Industry Fire Forum: www.joiff.com

Draeger Open Path Pulsar 2

Safety in Gas Detection

– more than money can buy

Steve Robinson, Sales and Marketing, Draeger Safety Gas Detection Systems explains

By Steve Robinson

Sales and Marketing, Draeger Safety Gas Detection Systems

Choosing a fixed gas detection system amounts to far more than the health and safety risk assessment might dictate.

There are a multitude of manufacturers offering equipment that is capable of detecting toxic or flammable gases and vapours, and it can be very tempting to select a system based on the lowest price offered. However, in addition to the front end installation costs and the initial purchase price of the hardware itself, users and operators of fixed gas detection systems must, and increasingly do, consider a host of other issues. These should include the lifetime ownership costs of the system as well as on-going maintenance and, of course, ease of use.

Where the detection of toxic gases or oxygen depletion are concerned, traditional small and mass produced electrochemical sensors have been eclipsed by larger, intelligent sensors. Featuring an EPROM memory which stores calibration information as well as gas data, such as target gas and range, these types of sensor are able to communicate with the transmitter. This built-in intelligence also includes temperature and pressure compensation which not only leads to higher accuracy but it also extends calibration intervals to just once a year. In addition, their large size gives dramatically improved longevity which, in turn, means that fewer replacement sensors are required and, as a result, the lifetime costs of the system are significantly reduced. They also offer better flexibility in terms of selectable response times, ppb (parts per billion) test rates and are available with a variety of mounting capabilities.

The use of these sensors is also easy. For instance, as the gas data is stored within the sensor itself and the sensors are received from the manufacturer pre-calibrated, they no longer have to be calibrated in the transmitter. Also, because of the plug-in construction, the sensor offers true "plug-and-play" functionality and, once installed in the transmitter, the EPROM communicates with the transmitter without the need for further intervention or calibration by the operator.

Advances in technology and better manufacturing techniques have also meant that the detection of flammable gases and vapours has improved, with traditional pellistor or catalytic bead detectors

Draeger PIR 7000

being replaced by superior technologies such as infra red (IR).

Immune to poisons such as H_2S, for example, IR technology is more robust and stable. The increased accuracy of IR is also able to reduce maintenance and calibration intervals. Now, instead of the need for six-monthly or, in many cases, the more frequent calibration intervals required by catalytic devices, IR systems such as the Draeger PIR3000 can extend calibration intervals to one year. Together with an overall life expectancy of more than 15 years, this technology dramatically reduces lifetime ownership costs.

The use of open path IR technology, where a multiple beam of infra red is transmitted over a distance of up to 200m to a separate receiver, can have other advantages. Where large areas need to be covered in perimeter monitoring, for instance, it can significantly reduce cabling costs.

These advances in technology now mean that even users of old pellistor systems, regardless of manufacturer, can upgrade to IR technology.

Designed to detect flammable gases and vapours, the ATEX approved DraegerSensor IR, for example, has been specifically developed to allow existing pellistors or catalytic bead sensors to be replaced easily, without creating technical problems.

Even in the harshest of conditions, these new poison resistant, fail-safe sensors are easy to install, simply unscrew the traditional pellistor and screw in the DraegerSensor IR.

The inclusion of a Wheatstone Bridge, which is able to duplicate a standard pellistor output, also means that existing cables and control devices, regardless of manufacturer, can still be used.

Requiring no adaptation to either the control system or the electrical wiring, this innovative sensor features 3-wire connection which eliminates the need for extra cabling. In addition, because of the availability of metric M25 as well as ¾ NPT thread with the new sensor, it can even be used with existing junction boxes.

The inclusion of a Wheatstone Bridge, which is able to duplicate a standard pellistor output, also means that existing cables and control devices, regardless of manufacturer, can still be used.

Enhancing plant safety

Gas detection systems work by generating an output signal that is proportional to the concentration of the relevant gas. This is transmitted either as analogue, using 4-20mA technology, or digitally via HART or other protocols such as PROFIBUS or Foundation Field Bus. Received by a controller, the data will be displayed, stored and evaluated. The controller will then initiate the alarm which might entail a company-wide alert, the closing of valves or a complete shutdown process.

For failsafe applications, open path gas detection systems measure the concentration of flammable gases across a multiple beam of IR light, in units of LELm. Representing the integral gas concentration along a line of sight, this does not give the concentration of the substance but, instead, provides the amount of gas present in the atmosphere. The amount of gas is an extremely useful measure as it directly indicates the hazard of a gas cloud. The more gas there is, the more severe the explosion is likely to be.

Transmitters can be installed in critical locations that are prone to possible leakage such as flanges,

pumps and compressors throughout the plant. They can also be positioned along the external boundaries. Some applications may benefit from a mix of detectors – a grid of detectors can easily locate a leak, whereas open path systems provide greater coverage per unit. Used appropriately, the right combination can serve as an early warning system to detect potentially hazardous situations and ensure sufficient time for counteraction to be initiated and damage to installations to be either avoided or at least minimised.

As well as the up front capital expenditure, the installation costs, on-going maintenance requirements and general running costs, the benefits that the system can bring in terms of time savings and potential loss of life, plant and end product should all be used in the lifetime costs evaluation.

However, the cost of ownership is just one of many considerations. Fixed gas detection systems are also required to conform to both ATEX (Directive 94/9/EC*) and Safety Integrity Level (SIL) legislation. ATEX is concerned with the ability to perform safety shutdowns and the use of approved equipment from sensors right through to control panels and cards that can handle multiple results. SIL is also making demands on users and suppliers alike in that it covers not just the system and the components, but the whole installation including cabling and processes.

ATEX

The ATEX Directives affect detection systems in two ways: the 1999/92/EC Directive applies to the safety of installation whilst the 94/9/EC Directive applies to equipment.

1999/92/EC Directive:

The aim of this Directive is to ensure that users fully understand, document and control explosive atmospheres. Explosive atmospheres should be removed but, where this is not possible, it states that ignition should be avoided. If an explosion were to occur then the effects of the explosion should be mitigated. In order to do so, it requires that the overall risk is assessed and that explosion protection documentation (EPD) is produced.

This documentation should clearly outline the risk in terms of probable explosive atmosphere (zone), minimise the risk by identifying possible ignition sources (equipment) as well as the nature of flammable materials (Group, T class) and ensure that users understand the impact damage if an explosion did occur (in health and safety, financial and environmental terms).

In addition, there is a requirement to train and warn personnel about the risks and to continue to monitor major changes to either the plant equipment or process.

94/9/EC Directive:

This Directive is clear to understand when considering equipment located in the hazardous area. It is also clear that any associated galvanic (zener) isolating device, even though it may be mounted in the safe area, must also be suitably certified for use. What is not quite so clear is that, when monitoring and protecting (primary protection) against the risk of explosion, the associated control equipment must also be certified.

This means that when a gas detection system or other system is considered to be a primary protection system or have a measurement function, the control equipment, which is located in the safe area, requires certification over and above the normal conformance to general standards.

As far as ATEX is concerned, gas detection systems can be categorised as:

- Those that are only used to emit an alarm:
  In these applications, the gas detector must be ATEX certified as safe for use in explosive atmospheres. However, neither the gas detector nor the associated control equipment requires a performance test and a second ATEX certificate.

Draeger Sensor IR

Draeger Sensor Calibration

- Those that perform a primary protection or measurement function:
  In this instance, the gas detector needs a supporting performance test for the measurement function, as covered in additional BS EN standards. Where these additional BS EN standards include the measurement function of the control equipment, the control equipment must also be tested and approved.

If in doubt as to whether the complete gas detection system requires full ATEX type and performance approval, there is one question that should be asked: "Is the gas detector removing the risk of explosion by, for example, switching off power, closing down valves or shutting off ventilation?" If the answer is yes, then both ATEX type and performance approval is required.

"Is the gas detector removing the risk of explosion by, for example, switching off power, closing down valves or shutting off ventilation?"

SIL compliance

Otherwise known as BS EN 61508, SIL is the international standard for electrical, electronic and programmable electronic safety related systems. It sets out the requirements for ensuring that systems are designed, implemented, operated and maintained to provide the required SIL level.

Many plants have to conform to a certain SIL rating. Whilst this rating comprises a number of factors such as the risk, severity and the likelihood of a significant accident, the products that are being used in such installations have to be within strict PFD value limits. PFD stands for probability of a failure on demand. There is a correlation between the PFD values of products and the SIL rating of an installation in that the smaller the PFD value, the higher the SIL rating of the installation will be.

The aim of a good system designer will be to use systems which, if subjected to testing just once a year, will fall as far below the maximum permissible PFD as possible. Not only will this save on system downtime, it will save on maintenance and replacement costs.

By offering a complete system approach, including installation as well as the controllers, cables, input and output devices and service and maintenance procedures, fixed gas detection users should be able to achieve a guaranteed Life Cycle Safety reliability in accordance with SIL requirements, for as long as the integrity of the system is maintained. Choosing the right system and supplier will mean that SIL compliance can be achieved at, almost, the touch of a button.

For this to be achieved, system integrity must be essential. For instance, should a user change the system parameters by, perhaps, performing service and maintenance at seven months instead of the recommended six, the probability of failure will have been changed and SIL will no longer be valid. For this reason, users should ask their suppliers to support each of their SIL installations with a set of comprehensive user notes. These should combine recommended guidelines with comments and examples to ensure that the ramifications of any changes are clearly understood.

No-one can or should put a price on safety. The good news, however, is that, with recent advancements in technology, suppliers should be able to provide systems that meet both safety and legislative requirements and that, in addition, reduce system downtime and minimise maintenance costs. These systems really do offer much more than money can buy. IFP

*Note: 94/9/EC Directive is currently under review

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New procedures f of on-site intume

By The Association for Specialist Fire Protection (ASFP)

A new Technical Guidance Document (TGD 0011) has been produced by the ASFP that considers the entire process of fire protection of steel structure using intumescent coatings. Its prime objective is to establish procedures for the specification, application and control of intumescent coatings on site.

In order to avoid the potential loss of life that may result from fire in occupied buildings, it's vitally important that all fire protection measures are installed in a manner that will assure their effectiveness and provide confidence that they will perform as required and intended in the event of fire.

In its section on 'Use of Guidance – Materials and Workmanship', Approved Document B goes further, in that it advocates the adoption of independent certification schemes specifically in the installation of fire protection, as follows:

> *'Since the fire performance of a product, component or structure is dependent on satisfactory site installation and maintenance, independent schemes of certification and registration of installers and maintenance firms of such will provide confidence in the appropriate standard of workmanship being provided'.*

The importance of fire safety has been further emphasised in recent legislation. Under the Regulatory Reform (Fire Safety) Order 2005, the 'responsible person' (who may be the owner, designer or architect, specifier or contractor) is responsible for ensuring that the structure is fully compliant with all known, current legislation appertaining to the fire protection of the building.

As is well known, Approved Document B of the Building Regulations provides guidance on the fire protection requirements and standards that must be observed in buildings in England and Wales. The regulations are not concerned with the commercial or financial losses that usually follow the destruction of a building by fire, but set out clear guidelines to ensure that in the event of a fire, the occupants of the building have both the means and the time to escape safely.

The key clause in Approved Document B is that which establishes this intent. It states that *'the building shall be designed and constructed such that, in the event of a fire, it will maintain its stability for a reasonable period'.*

The forthcoming BS9999 has developed alternative rules for fire protection beyond those in Approved Document B (ADB) and may be used as an alternative, approved basis for design. Both standards are intended to provide the same end result; safety in the event of fire.

Most major construction projects in the UK are designed using steel to create the shape of the structure and to provide its main load-bearing strength. Providing the strength of its steel frame is not subsequently compromised, therefore, the

or the installation scent coatings

building will remain intact.

In order to fulfil the requirements of Building Regulations to 'maintain the building's stability for a reasonable period', therefore, the load bearing elements in the structure must not be allowed to heat up to a temperature at which they begin to weaken and eventually, collapse.

There are several mechanisms by which steel structures can be insulated from the heat generated in a fire, in order to prevent or, at worst, delay collapse of the building. Active mechanisms include installing sprinklers or gas release systems, are intended to be activated as soon as a fire breaks out, to extinguish a fire within reach as soon as possible. Passive fire protection systems are installed on or around the elements to be protected and provide localised protection generally by thermal insulation. Active and passive systems complement each other to provide holistic fire protection measures in buildings.

Typical passive (built in) systems include fire resistant boards, mineral fibre, cementitious sprayed systems and intumescent coatings.

The Construction Markets Annual Survey (Corus Construction and Industrial, 2003) showed that intumescent coatings at that time held over 40% of the multi-storey market and that of this, two-thirds was applied on site and one-third off site (in shop).

The Steel Construction Institute (SCI) publication P160 provides design guidance on the use of **off-site** applied thin film intumescent coatings for structural steelwork in buildings. Guidance on intumescent coatings, both in general and for commercially available systems, is also available in the **Association for Specialist Fire Protection (ASFP)** publication *'Fire Protection for Structural Steel in Buildings'*, otherwise known as the *'Yellow Book'*.

The current publication provides guidance in the specification and use of intumescent coatings applied on site and deals specifically with hot rolled structural sections and hot rolled structural hollow sections designed for use in buildings. A new section 6 dealing with beams with web openings was introduced in 2007.

However, to assist further, a new up-to-date Technical Guidance Document (TGD 0011) has been produced by the ASFP that considers the entire process of fire protection using intumescent coatings. Its prime objective, however, is to establish procedures for the specification, application and control of intumescent coatings **on site**.

The ASFP had previously produced several Technical Guidance Documents (No's 3, 6 and 7) dealing with various aspects of intumescent installation. But now, all of these documents have been withdrawn in favour of the recently introduced TGD 0011.

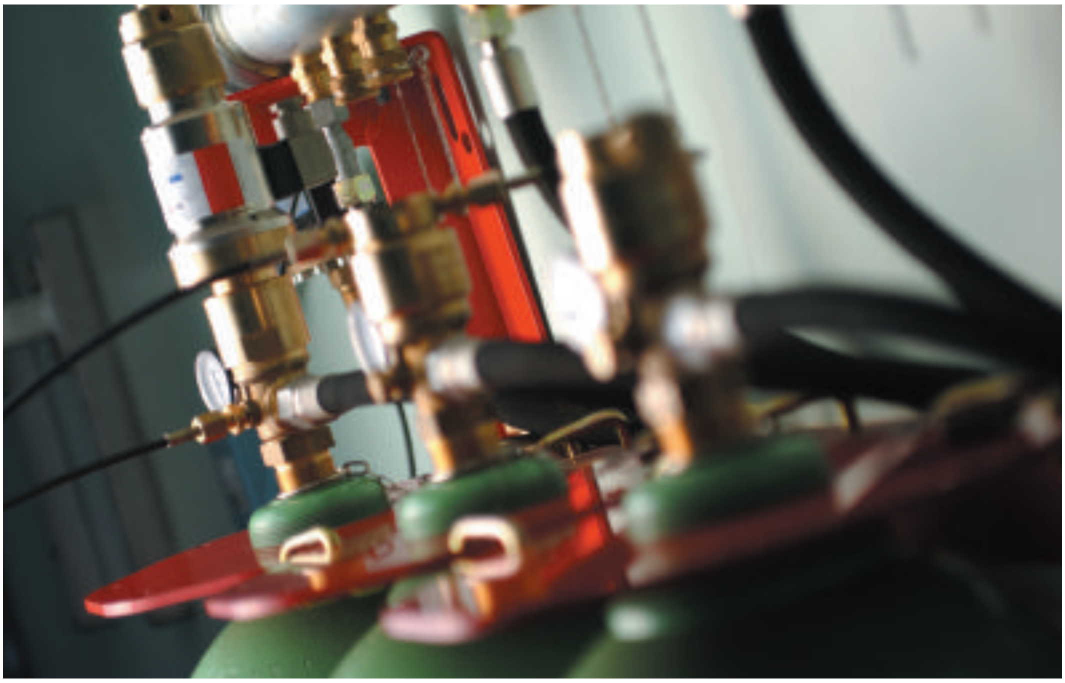
Not only will the procedures discussed ensure that the required level of fire protection is provided for the structure, but they should provide the evidence necessary to satisfy the 'responsible person' that the installation has been correctly carried out.

The new Code of Practice provides sections on:

- Factors affecting system performance
- Correct specification
- Design life, 1st maintenance and repair procedures
- Surface preparation and application procedures
- Control of site application procedures
- Standards of cosmetic finish that may be available
- Inspection criteria and thickness measurements.
- Recommended records and reports
- Site quality and inspection checklist
- Contract validation checklist

Most importantly, the Code of Practice also provides differentiation between the guidance on compliance with new EU Environmental Regulations that are intended to reduce the amount of organic solvents emitted to the atmosphere via the European Solvent Emissions Directive 1999/13/EC for *off-site applications* and that applicable to *on-site application* via the Paints Directive 2004/42/EC, which has been implemented in UK law as 'VOC's in Paints, Varnishes and Vehicle Refinishing Products Regulations 2005.

Copies of TGD 0011 can be downloaded from the ASFP website at www.asfp.org.uk or can be obtained from the ASFP, Tournai Hall, Evelyn Woods Road, Aldershot GU11 2LL. Tel: 01252 357832. Fax: 01252 357831. Email: info@asfp.org.uk IFP



Demand increases for clean agents

When selecting a fire suppression system, environmental considerations and the agent's clean credentials are now major considerations, often ranked with equal importance to the speed and efficiency with which the agent extinguishes a fire. So says Alan Elder, EMEA Sales Director for commercial suppression businesses for Tyco Fire Suppression & Building Products.

By Alan Elder

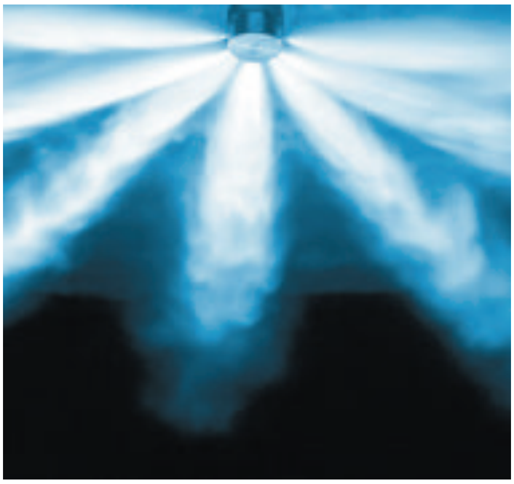
EMEA Sales Director,
Tyco Fire Suppression &
Building Products

This drive to satisfy the market's need for environmentally acceptable, clean suppression agents has led to a number of new systems coming onto the market since the banning of Halon 1301 under the Montreal Protocol on Substances that Deplete the Ozone Layer in 1987. However, many of these potential replacements have failed to live up to expectations in environmental terms, particularly since the 1997 Kyoto Protocol on climate change established the goal of reducing greenhouse gas emissions.

The criteria for a successful and sustainable solution means excluding any of the greenhouse gases identified by the Kyoto Protocol (or to give it its full title, the Kyoto Protocol to the United Nations Framework Convention on Climate Change) that represent man-made interference with the global climate system. The acceptable solution must have a negligible impact on the environment, insignificant global warming potential, zero ozone depleting potential and a low atmospheric lifetime. This is a daunting challenge that continues to elude many fire safety companies.

At the same time, organisations have become ever more aware that their survival is dependant on the performance of business critical assets, so their protection from fire is high on the corporate agenda. So much so that business continuity, crisis management and disaster recovery planning are terms with which we are all becoming increasingly familiar. At any one time, there seems to be a major conference taking place somewhere around the world addressing one key issue – how to ensure that the business survives a major disaster.

While this has always been a concern for businesses, their increasing dependency on communication and computer technology has shifted the fire protection attention away from assets generally. Today the concern is very definitely focused on safeguarding those assets that have the potential to debilitate or possibly destroy the business if it falls victim to fire. However, while the now-banned Halon 1301



proved to be extremely effective as a business critical asset fire suppression agent, environmental concerns were enough to consign it to the firefighting history books. It was followed by a number of other suppressants that ultimately also failed to win over the environmental lobby.

Environmental agenda

Several factors need to be considered when selecting the most appropriate suppression system. These include the nature of the asset that is being protected; whether the location is occupied; and what space is available for suppressant storage. Increasingly nowadays, the company's policy regarding environmental issues also has to be added, as does its attitude to long-term sustainability. The overall picture though is that the market now demands reliable, genuinely sustainable, environmentally acceptable and long-term fire suppression solutions.

Essentially, and depending upon the application, there are three gaseous fire suppression options that warrant detailed consideration. These are: inert gas systems; chemical suppression systems; and CO_2.

The scientists' initial response to the need for alternatives to ozone-depleting agents resulted in the unveiling of a number of often, as it transpired, prematurely heralded options. These Halocarbon alternatives comprised Halon-like compounds. Some proved effective and were adopted by the fire industry and building occupiers, while others failed due to their inefficiency or toxicity.

Inert gas option

Against this scenario, inert gas suppression has grown in popularity, as it answers the global warming challenge. Inert gas systems have precisely the environmental credentials that the market is demanding: zero ozone depletion potential, zero atmospheric lifetime, and zero global warming potential. They are also a truly sustainable "clean" fire suppression technology. Inert gases are non-toxic, they will not harm sensitive electronic equipment, art treasures or documents, and are safe to use in enclosed areas where people may be working.

While some inert gas systems use a single naturally occurring gas, most are a non-conductive and non-corrosive blend of naturally occurring gases, such as ANSUL® INERGEN®, which is a mixture of Nitrogen, Argon and CO_2, and HYGOOD® i3®, which is a 50:50 mixture of Nitrogen and Argon. They have a similar density to air, so the protected space retains its concentration far longer than was the case with Halon 1301. Inert gases work by lowering the oxygen content of the protected area to a point that will not support combustion, but is sufficient to sustain human life. Their appeal for use in occupied spaces is further enhanced, as the gases are invisible and so do not obscure vision, which might otherwise make panic more likely among the room occupants.

So, to organisations specifying that a non-chemical suppressant is of overriding importance, inert gas systems are an attractive option. Nevertheless, there is also a strong demand in the market for an acceptable chemical fire extinguishing agent; one that combines the advantages of the early Halon-like alternatives with the environmental profile of the inert gas systems.

Chemical system solution

An inevitable consequence of the signing of the Montreal Protocol was that Halon installations around the world had to be replaced with alternative systems, and the desire for long-term sustainability became a key driver.

Undoubtedly, the most successful of the early chemical replacements for Halon 1301 was FM200®, which has gone on to be used in thousands of successful telecommunications centres and computer suite installations around the world, and remains a very popular extinguishant. It fits the bill in several important respects: it is fast and causes no damage to sensitive electronic equipment; it also represents no risk to the room's occupants; it is free from any toxic side effects and has zero ozone depletion.

However, the latest way in which the need for environmental acceptability has been met is with the introduction of fluid-based systems that use sustainable, long-term technology, such as the SAPPHIRE® system that uses 3M™ Novec™ 1230 Fire Protection Fluid. This not only meets today's

legislative requirements, it also meets all of those in the foreseeable future. It utilises new technology and has several major advantages over other Halon alternatives.

The high performance fire-extinguishing agent has a negligible impact on the environment and is designed to protect essential and delicate telecommunications and data processing equipment. It also has applications within the cultural heritage sector protecting artefacts that would otherwise be destroyed by water from traditional sprinkler systems. It has an insignificant global warming potential, lower than any of the halocarbon agents acceptable for use in occupied spaces.

When discharged, SAPPHIRE leaves nothing behind to damage sensitive electronic equipment or documents, and with no agent clean-up required, business critical installations can be back in operation in the shortest possible time. Similarly, priceless historic manuscripts do not have to be subjected to years of restoration work.

Carbon dioxide

Surprisingly perhaps, there are those that, mistakenly, question the use of CO_2 because of its connotation with global warming, the international desire to reduce CO_2 emissions, and its inclusion in the Kyoto Protocol's basket of gases. This misunderstands the difference between CO_2 that occurs naturally in the atmosphere, and the large quantities of undesirable CO_2 emitted as a by-product of many industrial processes.

The CO_2 used as a firefighting suppressant is extracted from a number of natural CO_2 producing processes, and is then stored until it is needed.

However, CO_2 is most certainly not suitable for total flooding applications in normally occupied rooms or enclosures, as its discharge in fire extinguishing concentrations would be lethal to room occupants. CO_2 does however continue to be a popular and versatile choice for total flooding of unoccupied enclosed special-hazard areas such as power generation equipment, spray booths and turbines. An essential consideration though is to ensure that the flooded areas are adequately ventilated after discharge of the CO_2 to prevent the accidental exposure of personnel to dangerous levels of CO_2 when investigating the cause of the discharge.

One particularly attractive feature of CO_2 is that it can be compressed into a liquid state which, when maintained under pressure, requires a smaller storage footprint than many other gaseous suppression agents. Additionally, as CO_2 has so many other commercial uses, refills are readily available throughout the world.

The new suppression paradigm

The contribution made by the discharge of environmentally damaging gaseous fire suppression systems, is dismissed by some as being inconsequential. After all, they argue, they are primarily used to protect business critical assets and are believed to account for little more than three percent of the market. While this may well be true, discussion around the use of environmentally questionable agents is unlikely to abate.

Additionally, following the demise of Halon 1301 and the forced decommissioning of Halon suppression systems, the business community is more than ever focused on adopting sustainable solutions. Such solutions are also rightly seen as perhaps the only way of more effectively managing the world's resources, reducing waste and safeguarding the global environment. IFP

Call Points: Emb

Steve Martin, Product Manager with alarm signalling device specialist Cooper Fulleon, looks at Manual Call Points and the effect of the impending implementation of the Construction Products Directive (CPD)

By Steve Martin

Product Manager, Cooper Fulleon

What are the CPD requirements?

For many organisations within the Fire Industry, the Construction Products Directive (CPD) is a familiar Directive that has taken hold significantly over the past few years. Adopting the requirements on Manual Call Points has meant conducting a substantial re-think on the design and manufacturing processes and techniques.

A large number of construction products that are incorporated in a permanent manner into a *'Construction Works'* come under the scope of the CPD. The Directive lists a number of *'Essential Requirements'* for the Construction Works, which assures their suitability in the event of a generally foreseeable event. Fire alarm systems and components are specifically covered under the essential requirement of *'Safety in Case of Fire'*.

Demonstrating compliance

Demonstrating compliance using a Harmonised European Standard is an optional/preferred method used with the majority of European Directives, such as the EMCD (ElectroMagnetic Compatibility Directive) or the LVD (Low Voltage Directive). However, with the CPD, the use of Harmonised European Standards is essential. This is because the *'essential requirements'* in the CPD refer to the construction works as a whole, rather than to the individual construction products themselves.

In essence, this means that you need to meet all of the listed requirements laid down in the Annex ZA of an appropriate Harmonised European Standard. In the case of Manual Call Points, this is EN54-11. However, if the Manual Call Point contains other built-in functions, such as isolators for

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racing the CPD

example, then other EN standards may also apply.

Furthermore, self certification or assessment of a Manual Call Point is not an option. This is highlighted by the requirement levels for 'Attestation (or evidence) of Conformity' (AoC). There are six levels of attestation (1+, 1, 2+, 2, 3, 4) where 1+ is the most rigorous. Essentially, the level of attestation required increases with the consequences of a product failure. As we are talking about (life saving) Fire Alarm and Detection products and systems, the requirement for a Manual Call Point is for an attestation level of 1. The engagement of a Notified Body appointed under the government to conduct your assessment & certification is therefore mandatory.

In addition to the product requirements, the manufacturer also needs to implement a Factory Production Control (FPC) System under the CPD. This helps to ensure the consistent quality of the product during manufacture, once compliance has been demonstrated. An FPC Inspection is conducted by the Notified Body before a certificate is issued, and is monitored periodically with further FPC Inspections.

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Implementation for Manual Call Points

The move to mandatory third party testing and certification has had a wide ranging impact on new product development. At Cooper Fulleon, a reassessment of almost every aspect of the design-development process has taken place, from initial market research and product requirement specification, though the design process to the final techniques used for manufacturing and test. Even the way in which products are promoted and the emphasis on their intended uses has been considered.

Important questions have been asked about the breadth of the Cooper Fulleon Call Point Families, the way in which the range sits together, what common elements can be used across a product line, which specifications are essential to the market, etc. Before mandatory third party testing was introduced, the majority of the cost for new product development was in tooling or development of new technology. Certainly as far as Manual Call Points are concerned, mandatory third party testing has been one of the single most significant costs in the product range development project, and has been significantly higher for more complex variants containing additional functionality such as isolation, etc.

To meet the challenges that the CPD has presented, a new and more global approach was necessary. At Cooper Fulleon, we have looked at our entire product range and reassessed the requirements and specifications, looking closely for any redundancy or duplication. Pragmatism is key to a successful approach and some difficult decisions have to be made, but ultimately the effort will pay dividends. Working closely with our customers and the Notified Bodies has been key to the successes Cooper Fulleon has had so far with the CPD. Where difficult decisions have had to be made, we have involved our customers at the earliest practical opportunity, thus enabling a more sustainable and cost effective solution to be implemented. The whole process can be very slow and painstaking, but persistence will result in a more coherent and cost effective solution long term. It is not just the costs and management of the certification that needs to be considered, but the legacy of control and complexity that will follow.

What are the benefits?

The resulting upside of Third Party Product Certification has been that overall product quality, performance and reliability has further improved. However, it is not merely the additional testing and auditing that has lead to this improvement in quality and performance. The requirement to implement a 'Product Specific' Factory Production Control System has lead to the quality control process identifying quality issues at an earlier stage in the implementation and production processes.

Another consequence and benefit is likely to be product rationalisation and modularity. There will be a tendency for manufacturers to offer more functionality or modularity on one core product, to help reduce the cost impact of third party certification on many variants. At Cooper Fulleon, we have further improved the flexibility of our CX range of

Manual Call Points by re-evaluating the essential specifications, and rationalising the range to produce a more flexible and adaptable product. This has helped to minimise the cost of the certification process without compromising product functionality. By making our CX Manual Call Point range 'Universal', we have also catered for a wider market using a more streamlined product family. Further benefits have also resulted from an upgrade to the Cooper Fulleon CXL weatherproof outdoor Manual Call Points. Due to a re-alignment of the interpretation of the standards, it will now fulfil all the requirements of EN54-11 whilst retaining the compact styling of the indoor version.

Special regional requirements and a lack of 'Agreement of Understanding' between the European Notified Bodies still results in some difficulties in this area. There is still no ideal single European product, since special versions are almost always required for certain markets.

Market differences

It must be noted that the designated objective of any of the European New Approach Directives, including the CPD, is to breakdown the barriers to trade within Europe. In theory, this means that a product designed and manufactured in one country can cross borders within Europe without any barriers to its introduction on the market. However, special regional requirements and a lack

of an 'Agreement of Understanding' between the European Notified Bodies still results in some difficulties in this area. There is still no ideal single European product, since special versions are almost always required for certain markets.

Furthermore, some markets will simply not open up with just a CE mark under the CPD. Additional approvals using national standards are often required to satisfy specific regional and market requirements, thus resulting in some dilution of the objectives of the CPD. However, the additional requirements required by some countries within Europe can only be just that . . . *additional*, and cannot conflict with or contradict a specific requirement within the official harmonised standards. Cooper Fulleon has catered for these specific markets and regions with a range of 'special build' Manual Call Points with additional functionality or labelling requirements.

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At present, CE marking to the CPD may not be mandatory in the UK or some other European countries, but it is important to ensure that you are not caught out if or when it does becomes mandatory. In many other countries within Europe it is a legal requirement. At Cooper Fulleon, we believe that it is essential to fully embrace the new requirements. It is important to try and gain some real benefits from the process by effecting real improvements in performance, quality and flexibility. We have gone some way to achieving this with our updated and certified CX Manual Call Point Range. IFP

Figure 4: Example of a system for tracking calibration of pressure gauges

Managing Change of Fire Sprinkler System Water Supplies

By Neil P. Wu, P.E.

Building codes commonly require sprinkler systems for life safety and property protection in new construction and existing structures. Degradation of the water supply or impairment to a sprinkler system can have catastrophic consequences. Periodic inspection, testing, and maintenance (ITM) of the sprinkler system is an essential, often mandated, and expected preventive measure to promote proper operation of a sprinkler system. Citations and fines may be issued for failing to properly inspect and maintain critical fire protection systems. In extreme cases, unexpected business interruption may result if unsafe conditions persist.

Owners, property managers, insurance companies, and maintenance contractors are all stake holders in protecting life and property. Each can be subjected to undue risk if improper testing and/or maintenance are found to contribute to fire damages caused by an under-performing sprinkler system. Good engineering practices are discussed for the management of change of the water supply conditions and the evaluation of water supplies for automatic, wet-pipe, water-based fire sprinkler systems.

Background

Understanding the underlying principles of fire protection system design reveals the importance of conducting proper sprinkler system main drain tests. The National Fire Protection Association (NFPA), an international consensus code development organization, publishes standards to address the minimum requirements for the installation of automatic fire sprinkler systems. NFPA 13, *Standard for the Installation of Automatic Sprinkler Systems*, is an industry recognized reference which is commonly adopted for enforcement of fire sprinkler system installation by local authorities.

The occupancy hazard fire control approach contained within NFPA 13 assumes a fire involving a particular fuel class and load will grow at a pre-determined rate and intensity (e.g. light, ordinary,

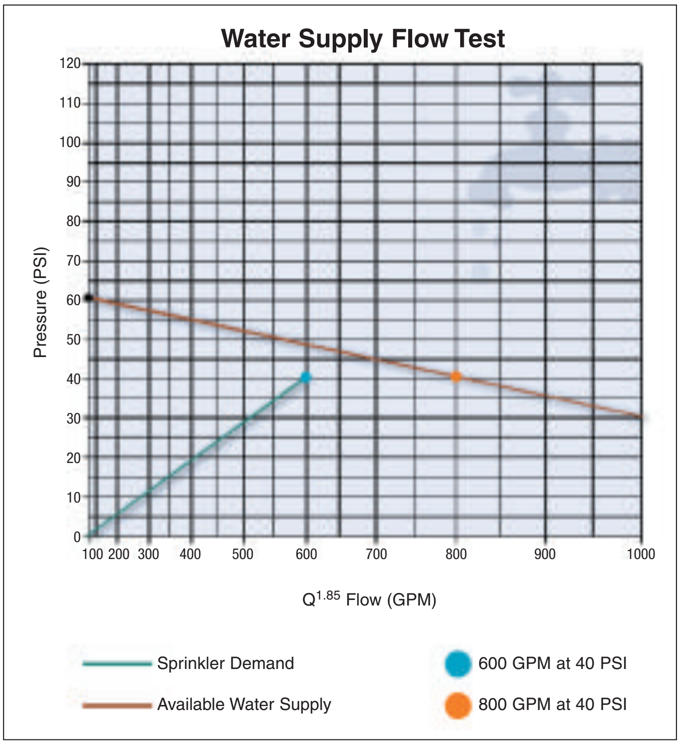

Figure 1: Water supply curve showing the available water supply and sprinkler demand

extra hazard occupancy classifications) and will spread until it is confined by either the physical construction of the structure or operation of the fire sprinkler system. The area of fire spread corresponds to the empirically derived area where fire sprinklers are expected to activate and subsequently contain the fire, referred to as the "design area" or "most remote area". The simultaneous flow of sprinklers within the design area produces a hydraulic demand of both the flow of water (gallons per minute – gpm) and the system pressure (pounds per square inch – psi) needed to produce the proper sprinkler discharge density and droplet pattern over the design area.

Much of a sprinkler system's overall performance relative to controlling the fire is dictated by the available water supply, assuming that the proper design was applied to the hazard being protected. The basic principle of a hydraulically designed water-based fire sprinkler system is that the peak flow and pressure demand is no greater than the available supply. If an inadequate flow and/or system pressure is delivered, the sprinkler system is likely to operate improperly, possibly allowing the fire to spread out of control.

The hydraulic demand at a system reference point, such as the base of riser (BOR), can be graphically compared to the available supply to determine the adequacy of the water supply. A hypothetical system demand is shown in Figure 1 where the system demand point is less than the supply curve (plotted as a line on semi-log graph).

The design margin or "buffer" is the pressure difference in the available supply curve and the system hydraulic demand point, in psi. The model codes governing the design of automatic sprinkler systems are silent regarding the minimum design buffer, leaving the size of the margin to the discretion of the designer. The buffer should account for foreseeable variations in water system strength such as seasonal effects and peak water consumption hours.

Water supply evaluation

Accurately characterizing the flow and pressure of the available water supply is paramount not only during the initial design and installation of a fire sprinkler system, but also for the continued protection of the building. The following actions are provided for consideration for the ITM of water-based wet pipe fire sprinkler systems:

1 *Perform periodic testing of the fire sprinkler system*

NFPA 25, *Standard for the Inspection, Testing and Maintenance of Water-Based Fire Protection Systems*, is a reference commonly adopted for enforcement. NFPA 25 offers a schedule of preventive ITM activities. In particular, with respect to water supply, Section 13.2.5 of NFPA 25 states that a main drain test shall be conducted annually at each water-based fire protection system riser to determine whether there has been a change in the condition of the water supply, supply piping, and control valves. Although it is customary to consider the main drain test as an "annual" event, more frequent tests are required depending on the water supply configuration. The frequency of the main drain test is increased to a quarterly basis where the sole source of the water supply is through a backflow preventer and/or pressure reducing valves. Individuals responsible for the maintenance of sprinkler systems should verify these tests are being conducted on a timely basis in accordance with NFPA 25 or other applicable requirements.

During the main drain test, the static system pressure is recorded from the system riser gauge as shown in Figure 2. The main drain valve is opened fully and the residual (i.e. flowing) pressure is recorded when the flow stabilizes. After the residual pressure is recorded, the main drain valve is closed and the system pressure is recorded

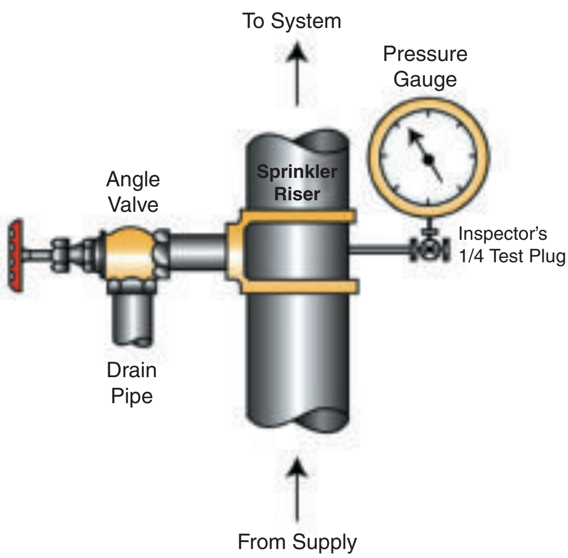

Figure 2: Diagram of typical main drain arrangement on a sprinkler riser

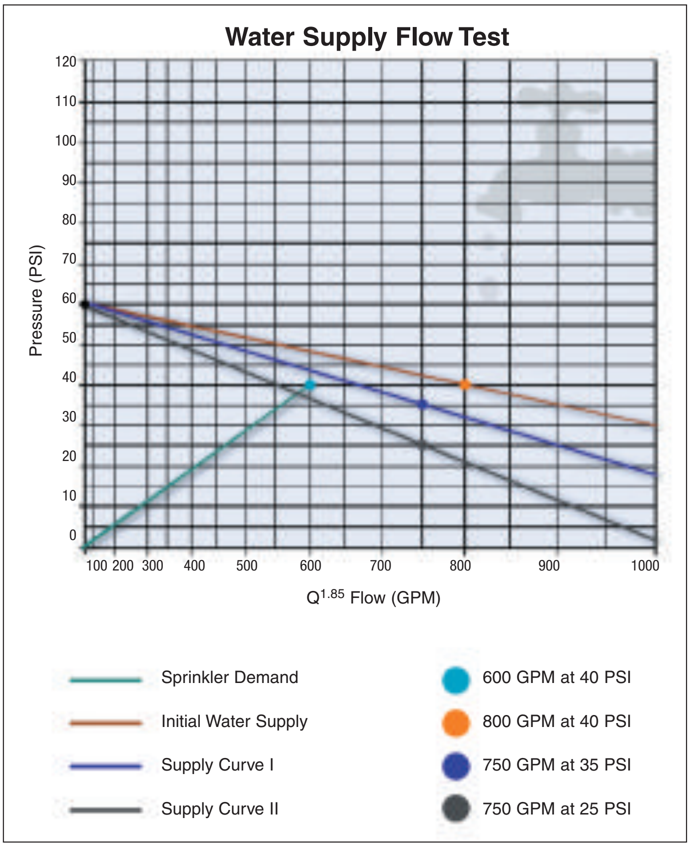

Figure 3: Water supply flow curves for multiple tests versus sprinkler demand

again. The static system riser pressure observed prior to flowing water (i.e. static pressure) and the residual pressure are used as a benchmark and are compared to previous main drain flow test results. Written records should be kept by the building owner for future reference and troubleshooting.

2 *Conduct an initial water distribution system analysis*

A key fundamental to using the main drain test data to monitor changes in the water supply assumes that the water supply was adequate at the time of original installation of the system. Performing a water distribution system flow test (i.e. hydrant flow test) at the initial acceptance testing for comparison to the sprinkler system design is often overlooked and not validated during the building construction inspection process. Original data obtained well in advance of construction may not accurately describe the water supply strength when construction is complete, and more importantly, at the time of building occupancy.

Although a main drain test may repeatedly produce similar residual pressures at regular inspections, the system supply may have been inadequate from inception. Without calibration of the actual water distribution supply curve to the sprinkler system design criteria, an inadequate water supply can remain undetected despite performing the required main drain tests.

NFPA 291, *Recommended Practice for Fire Flow Testing and Marking of Hydrants*, is a recommended practice that addresses hydrant flow tests. For new building construction, a hydrant flow test should be performed at the time of initial acceptance testing for the sprinkler system, just prior to building occupancy. For an existing system in service, a water supply flow test should be performed at the next inspection interval, if the baseline test was not performed and recorded at the completion of construction. The water supply curve can be used to validate the design flow data used by the design professional and/or installing fire sprinkler contractor and for calibration of the main drain test residual pressures. If the as-built data does not agree with the design flow test figures and/or the supply is inadequate to satisfy the sprinkler system demand, investigation of the water supply should occur immediately.

After the water supply curve is characterized and determined to satisfy the sprinkler system demand, future main drain tests results can be checked against the baseline value to confirm water supply adequacy. With this foundation established, the results of the main drain test can be used with confidence.

3 *Investigate reductions in main drain residual pressures*

The 2008 edition of NFPA 25 includes a new provision that states where a 10 percent reduction in the full flow pressure is observed from previous results, the cause of the reduction shall be identified and corrected. However, good engineering practices dictate that **any** reduction in the residual pressure observed during a sprinkler system flow test should be investigated. A decrease in residual pressure is a possible indicator of a deteriorated water supply, obstruction, closed valve, or other system impairment. At a minimum, the investigation of the reduced residual pressure should consist of an impact analysis to determine the effect on the sprinkler system hydraulic demand.

The pressure buffer of a sprinkler system can vary depending on the system designer's anticipation of nominal consumption, future demand, infrastructure improvements, seasonal pressure changes, etc. Minor changes in the observed main drain test residual pressure can swing the demand/supply relationship into a deficit, resulting in an inadequate water supply. When conducting a main drain test, observation of a drop in residual pressure from a previous result is a qualitative indicator of diminished water supply strength. Investigation of any drop in main drain test residual pressure should occur prior to the 10 percent threshold, since this prescriptive requirement does not account for systems that have smaller design cushions which can be overcome by slight decreases in residual pressure. The main drain test can be used to detect a weakening water supply, but the impact on the sprinkler system is best determined by conducting a hydrant flow test.

If the hydrant flow test is conducted as recommended in Item 2, and results show that the water supply curve differs from the original designer's data, the first step is to determine the impact on

the fire sprinkler system demand. For instance, given the original design curve and system hydraulic demand point shown in Figure 1, the water supply curve is reduced upon measurement as graphically illustrated by the purple line (Curve I) in Figure 3. In this case, the observed reduction in the water supply strength is not expected to affect the fire sprinkler system operation, since the sprinkler system demand remains less than the available supply curve as a result of a robust pressure buffer. No additional remediation is necessary for this case.

The grey line shown in Figure 3 represents a second hypothetical flow test data set (Curve II) obtained from hydrant flow testing. In this instance, the water supply curve is exceeded by the fire sprinkler system demand point. For this scenario, the fire protection system will not provide the water capacity and/or pressure to the system as intended. To meet the sprinkler system demand, a means to fortify the water supply is necessary (e.g. installation of a fire pump, elevated water tank, system piping, etc.). A fire protection engineer or other qualified personnel (e.g. licensed fire protection contractor) should be consulted to evaluate the system design and implement an appropriate solution based analysis of all relevant details.

4 *Test and calibrate pressure gauges*

The data obtained from sprinkler system testing is only as valid as the instruments used for measurement. Relying on faulty pressure gauges can produce inaccurate test results. Contractors performing ITM services should be instructed to inspect and test pressure gauges periodically to verify proper operation. Based on NFPA 25, Section 12.2.8, pressure gauges are to be inspected on a monthly basis and replaced with a calibrated gauge or tested every 5 years to be within 3 percent of the full scale in comparison with a calibrated gauge. A system for identifying components and the date of replacement or calibration (e.g. affixing unique identification numbers and dates) should be incorporated as shown in Figure 4.

Written records should identify the specific gauges replaced or tested, and records should be maintained for no less than 5 years after the next inspection, test, or maintenance period. Requiring a contractor to inspect and use properly calibrated gauges can prevent the collection of misleading test data.

5 *Establish a management of change protocol*

Performance of periodic ITM by qualified personnel is important in managing changes in water supply conditions. As a start, records related to these activities serve as a basis for monitoring change and should be retained by the property owner for reference. Most importantly, a protocol should be developed in collaboration with the parties responsible for ITM of the sprinkler system to identify change, determine the impact, and remedy the deficiency. In the event a sprinkler system is impaired, administrative procedures for notification and mitigation are presented in NFPA 25, Chapter 14, and should be included in the protocol.

The protocol should include the investigation procedures for use when a reduction in the water supply is detected. A hydrant flow test upstream of the sprinkler system may serve as a starting point to determine the cause of the pressure reduction. If the water distribution system is found to be adequate, the cause of the reduction is likely to be found between the point of connection (POC) to the water utility and the sprinkler system riser. System components from the POC, including control valves, backflow preventers, and pressure-reducing valves, should be inspected and tested for proper operation. Additional direction is provided by NFPA 25, Chapter 13, for investigating fire protection system piping for possible sources of materials that can cause blockage. After repairs are made, the sprinkler system should be restored and tested to verify hydraulic performance is satisfactory.

Summary

Based upon international model fire codes, the obligation for proper ITM of a building's fire sprinkler system generally rests with the owner of the property. Responsibility for these activities can be delegated to a qualified contractor, but the owner should stay involved to see that the delegated tasks are being completed properly and on a timely basis. Failure to conduct the required ITM on the critical fire protection systems can result in citations, fines, and possibly business interruption. Improper ITM can also result in undue risk for damages in the event of a fire and improper sprinkler operation.

The successful operation of a fire sprinkler system relies heavily on the characteristics of the available water supply. An inadequate water supply can cause improper operation during a fire event leading to unnecessary fire damage. Internationally recognized fire standards are available and provide the requirements for ITM of fire protection systems. The frequency of main drain testing is often overlooked. Based on industry standards, the testing can be on a quarterly basis, depending on the water supply configuration.

Original flow test data used for sprinkler system design can be subject to significant change as a result of diminished strength of the available water supply. An initial water distribution flow test should be performed for calibration and comparison to the sprinkler system design criteria and hydraulic demand. Without such testing, the main drain test may not detect a sprinkler system that was constructed with an inadequate water supply.

During the main drain test, any observed reduction in residual pressure should be investigated immediately rather than waiting for a 10 percent drop, as some sprinkler systems are sensitive to small pressure changes. The impact on the system's intended operation should be examined to determine if the weakened supply is still adequate to satisfy the system demand.

Properly calibrated gauges are necessary for performing ITM, and a system to track the calibration date of equipment should be implemented. A protocol to address changes in the sprinkler system water supply should be developed in collaboration with involved parties to outline responsibilities, timing, and actions. Implementing these steps will reduce the potential for an inadequate water supply to remain undiscovered. IFP

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Global Crisis M

Steps to Developing a Global Crisis Management Approach

In current times, companies are moving towards globalization of services and locations to better serve clients worldwide. With this move to globalization, managing global business operations also needs to address crisis management on a global basis. In the event a crisis affects a section of company's global market, companies need to be able to respond to the crisis effectively and pro-actively to maintain stability to their clients.

By Jon M. Evenson

Senior Consultant, Rolf Jensen & Associates (RJA)

Global crisis management consists of creating a streamline process of managing crisis on a local, regional and global basis depending on the severity of the crisis that has occurred. To effectively develop a global crisis management program, a company needs to address several issues to manage, communicate and respond to a crisis that could occur in various locations worldwide. These issues include 1) Standardized Crisis Management Team Structure, 2) Standardized Crisis Levels, 3) Standardized Crisis Response Procedures, 4) Standardized Crisis Communication Program and 5) Training and Integration with Local Authorities.

Global crisis management is an ongoing process that should be started when a company starts to expand operations to other locations outside their base of operations where crises could adversely affect operations. The global crisis management program should be spearheaded by the corporate level management and filtered down to the local management teams in the areas of operations.

Global crisis management is an ongoing process that should be started when a company starts to expand operations to other locations outside their base of operations where crises could adversely affect operations.

Step 1: standardized crisis management team structure

To effectively manage a crisis, a crisis management team structure should be developed to identify key aspects of the response efforts that need to be managed. Without a structured team identified, a company may face challenges in coordination, communication and management of crisis on a local level, regional level and even a global level. The crisis management team structure should include standardized team structures for levels of the company including local management teams and a corporate management team.

The team structure needs to create a uniform structure throughout the company that allows for easier management of crisis in the event the crisis escalates from a local crisis to a larger, more global crisis that adversely affects more business units of the company. The top level of the crisis management team structure should be coordinated at the corporate management level. The corporate level crisis management team should be responsible for the overall management of response efforts with a focus on maintaining the stability and operations of the business during and after the crisis has occurred.

In the event of a large scale, global crisis, the corporate crisis management team should be responsible for determining resources required to assist in response efforts, identifying mutual aid support that needs to be coordinated and coordinating with local and regional management teams that may need additional support due to the nature and severity of the crisis.

The corporate crisis management team should include positions that are responsible for various aspects of the response including: 1) Crisis Commander – position responsible for the overall coordination of the response efforts of the company; 2) Crisis Operations Office – position responsible for coordination and management of response efforts;

anagement

3) Crisis Administrative Officer – position responsible for the management of documentation and information related to the response efforts conducted by the corporate crisis management team; 4) Crisis Communications Officer – position responsible for the management of communications and public relation-related information related to the crisis and 5) Crisis Liaison Officer – position responsible for coordination of local authority relationships and support during a crisis.

The local crisis management teams should be developed for each business unit that is operating in the businesses various operational regions. These local crisis management team structures should be supported with the same team structure as the corporate crisis management team structure to allow for efficient communication and response coordination in the event of a crisis. During a crisis, the local Crisis Commander should be able to effectively manage the response efforts at his/her location, but should also be able to communicate with other local Crisis Commanders to coordinate response efforts.

In addition, the other positions should be able to effectively communicate with their respective corporate team members to maintain a cohesive response process. By creating this standardized team structure, all parties in the company responsible for crisis management understand the nature, severity and response steps being taken manage the response.

The effectiveness of global crisis management is dependent on the ability of the team members to have clear and concise responsibilities before, during and after a crisis. If a crisis occurs on a local level, a company's crisis management goal is to effectively respond and contain the crisis at a local level and provide the needed support to the local crisis management team to effectively manage the crisis and maintain a safe environment. In addition, the corporate crisis management team should be involved to ensure the company's public image and operations are not hindered during and after the crisis.

By standardizing the crisis levels, all locations in a company's global operations would be able to manage a crisis in a uniform manner that allows a company to effectively manage operations and crisis response efforts while minimizing the negative impacts the crisis might have on operations and the company's public image.

Step 2: standardized crisis levels

A global crisis management approach should include a standardized manner to escalate response efforts on a local and global basis. The global crisis management approach should include standardized crisis levels (Crisis Level 1–Crisis Level 5) that allow for both the local and corporate crisis management teams to escalate the response efforts depending on the nature and severity of the crisis.

Each type of crisis that can occurs should be identified and be assigned crisis levels that allow the corporate and/or local crisis management teams to escalate and de-escalate the response efforts and resources. Crisis Level 1 crises are those which only affect a single location and don't require the assistance of the corporate crisis management team. Crisis Level 5 crises are those which affect multiple locations and/or could adversely affect the company's operations or public image.

The standardized crisis levels should also include trigger points that escalates the crisis from Crisis Level 1 to Crisis Level 5. Within each Crisis Level, there should be information on how the crisis will be locally managed and what corporate resources will be utilized to assist in the response efforts. This approach would allow a company's global crisis management program to coordinate response efforts and resources without affecting company operations not affected by the crisis. In addition, this type of scalable approach allows a company to increase or decrease response resources and personnel as dictated by the crisis' location, nature and severity.

In this standardized crisis level approach, a local crisis management team would be expected to manage a crisis at a local level until the crisis requires additional resources above and beyond

the local crisis management team's abilities or responsibilities. When a crisis severely affects local operations, the local crisis management team needs to have the ability to call on additional resources to contain the crisis and minimize negative impacts on their operations.

By standardizing the crisis levels, all locations in a company's global operations would be able to manage a crisis in a uniform manner that allows a company to effectively manage operations and crisis response efforts while minimizing the negative impacts the crisis might have on operations and the company's public image.

Step 3: standardized response procedures

A global crisis management program should address and develop response procedures for various crises that could adversely affect any of the company's locations. By identifying and creating response procedures for the various crises that could occur, a company can implement, train and integrate the response procedures into both the local management's operations and the local authority's response procedures. A Response Procedures should be developed into a standard format to allow both corporate and local crisis management teams the ability to understand and learn their roles and responsibilities for each type of crisis in a standard formatted document.

By standardizing the format of the response procedures, it allows a company to easily maintain, update and coordinate with various locations without confusion on how a local crisis management team should respond during a crisis. For a response procedure to be effective, the documents should be designed with various sections that provide specific information related to each of the responses including: 1) General Information, 2) Response Procedures, 3) Team Member Tasks and 4) Appendix Information.

In the General Response Information section of the Response Procedures, general crisis response information related to 1) Procedure Activation, 2) Procedure Deactivation, 3) Local Authority Integration and 4) Crisis Communication Information should be clearly identified. This is general information that identifies how the appropriate

The Standardized Response Procedures provide the basic documentation of the company's crisis management program and also provides information to be used during training of the local and corporate crisis management team members responsible for assisting in crisis response efforts.

company should attempt to identify crises that could affect operations including crises related to: 1) Building-Service, 2) Human Behavior, 3) Terrorism and 4) Weather.

Each response procedures should be designed to provide a documented response procedure that can be utilized to train staff in how their position is responsible for responding to a crisis. The procedure will be activated and how information is communicated at both a local and corporate level.

In the response procedures section, response procedural steps should be developed in both written and graphical methods to allow for easy comprehension by the local crisis management team. In the response procedure section, each

team member's tasks should be clearly stated in easy to understand language to allow for them to easily understand the basic steps that they are responsible for during various crises and severities. The team tasks should be standardized for responses to allow each team member to understand and implement a specific set of response steps.

The Standardized Response Procedures should also develop the team member tasks into checklists that would provide for clear documentation of tasks that team member conducted during a crisis. Additionally, the checklists should be developed into a training document to be used during the crisis management training sessions.

The Standardized Response Procedures provide the basic documentation of the company's crisis management program and also provides information to be used during training of the local and corporate crisis management team members responsible for assisting in crisis response efforts. In addition to procedural steps, the response procedures also identify when additional outside support may be requested and activated. This is critical to the success of a global crisis management approach due to the fact that in large-scale crises that affect multiple company locations, additional support and coordination will help minimize the negative impact the crisis has on the company and the company's future.

Step 4: standardized crisis communications

During and after a crisis, one of the most critical aspects of response is communication between the corporate team and local team, the local team members and the control of public information. For global crisis management, a company should look to standardize the methods of communications both internally and externally to coordinate appropriate response efforts and maintain a positive public image.

The standardization of crisis communications includes developing standard methods for communication of crisis information before, during and after a crisis to allow for all responsible parties to understand the nature, severity and location of the crisis and what response efforts are being conducted and need to be conducted. In addition, corporate standardization of crisis communications to public outlets (television, radio and print media) need to be developed to coordinate a standard approach on how crisis-related information will be shared with public outlets. This standardization of crisis communication to public outlets will allow a company to effectively manage what information is distributed and ensure the information's accuracy.

A standardization of crisis communications should look at developing a "One-Voice" stance on crisis communications. This allows a company to identify a single point of contact at both the local and corporate level to issue public statements and news releases related to a crisis. This reduces the possibility of employees at the corporate and local level making crisis-related statements "on behalf" of the company without accurate information.

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Step 5: training and integration with local authorities

Both a global and local crisis management training program should be developed and include an interactive aspects including Classroom Training Sessions, Table-Top Training Sessions and Crisis Response Drills. Traditional Classroom Training sessions should be designed to provide training information to the management teams that will be responsible for the management and implementation of the crisis management programs on a corporate and local level.

The second aspect of the crisis management training program is to develop and conduct Table-Top Training Sessions. These sessions provide both the corporate and local crisis management team members with 'real-life' scenarios where they are responsible for working through their response efforts. Table-Top Training Sessions are valuable to the team members because they allow responders to review their response procedures in a controlled environment.

The last stage of the crisis management training program is to conduct live local and global drills with local and corporate crisis management teams. Due to the nature of operations, full-scale drills may be difficult to implement, but local live drills should be conducted with local crisis management teams on selected basis to further enhance their comprehension of their responsibilities during a crisis.

Throughout a crisis management development and training program, the local authorities should be invited to participate. Their involvement in the will provide an additional level of understanding of the company's crisis management procedures and will also identify issues and concerns that may modify how the company coordinate response efforts at the local and global level.

The involvement of the local authorities during the global and local crisis management development process will provide invaluable insight on how the local authorities plan on providing assisting to the company during a crisis. Without the involvement of the local authorities, a company's crisis management program will not be complete due to the fact that in a crisis situation, the involvement of the local authorities will be the deciding factor on how the crisis impacts the company's operations at both the local and global level.

Conclusions

Crisis management is challenging at the local level, let alone trying to globalize crisis management. That being said, companies should look into creating global standards for crisis management to assist in the effectiveness and coordination of response efforts. These steps identified in this article are only pointers to starting the process of effective global crisis management and each company's goals, concerns and operations will affect how global crisis management is achieved. IFP

CO_2 suppression

– Effective, versatile and cost-effective

Although numerous fire suppression agents have come onto the market in recent years, CO_2 (Carbon Dioxide) continues to be a popular and effective choice for many applications. John Allen, EMEA Marketing Director for Tyco Fire Suppression & Building Products, explains.

By John Allen

EMEA Marketing Director, Tyco Fire Suppression & Building Products

It is close to impossible to watch television anywhere in the world these days without hearing Carbon Dioxide mentioned, often in the same breath as terms such as carbon footprint and global warming. So it is easy to forget that CO_2 continues to be a very effective fire suppressant; one that has been used to fight fires for the better part of 100 years and that, in all probability, has been used to safely extinguish more fires in unoccupied enclosures than any other gaseous suppressant.

But, in case the media has spawned any lingering confusion surrounding the use of CO_2 as a suppression agent, let us first look at a couple of facts. Fact One: Carbon Dioxide occurs naturally in the atmosphere, and the gas used as a firefighting suppressant is extracted from a number of natural CO_2 producing processes. It is then stored until it is needed. Fact its use in fire protection is insignificant compared with the emissions and environmental damage caused by an uncontrolled fire, or the huge quantities of CO_2 emitted into the atmosphere as a by-product of many industrial processes, particularly in some of the fast developing emerging nations.

Unoccupied space suppression

But, CO_2 is not without its practical limitations and its use – however valuable in fire suppression terms – must not include total flooding applications in normally occupied rooms or enclosures. This is because the discharge of CO_2 in fire extinguishing concentrations is lethal to room occupants. Because of this, it is also essential to take steps to ensure that any CO_2 flooded areas are adequately ventilated after discharge to prevent accidental exposure of personnel to dangerous levels when investigating the cause of the

discharge. CO_2 is one-and-a-half times heavier than air, so it tends to collect at low level and in under-floor voids and ducts.

Where CO_2 systems do come into their own is when seeking to provide total flooding protection for unoccupied spaces. These include unmanned control equipment rooms, engine compartments, plant rooms and printing presses. It is also a popular choice of suppressant for local discharge using portable extinguishers for Class A fires that involve organic solids such as paper, wood; Class B fires involving flammable liquids; and Class C fires that involve flammable gases.

So, CO_2 is an effective, versatile and cost-effective fire suppressant. While build quality of the systems and the application of health safeguards are essential, properly designed and correctly maintained, CO_2 is an excellent fire suppression agent that can play a major role in protecting vital business assets.

Clean agent performance

When discharged, CO_2 leaves nothing behind to damage sensitive equipment, and with no agent clean-up required, business critical installations can be up and running again in the shortest possible time. This is an important consideration because, as well as avoiding any clean-up costs and the possible need to replace damaged equipment, the cost of a business being out of operation for any length of time can be crippling. Indeed, research published in the Alinenan ROI Report in 2004 suggests that the downtime in some businesses can cost as much as US$1 million an hour.

Total Flooding applications

The latest CO_2 systems incorporate a new cylinder valve and nozzle design enhancements, and are easily integrated with the latest generation of sophisticated fire detection and alarm systems.

A typical engineered system today uses individual steel storage cylinders with 16kg, 23kg, 34kg and 45kg capacity that can be manifold-linked together to enable rapid and simultaneous discharge of the CO_2 gas. This gas is stored under pressure and is piped to the protected room or enclosure, where it is discharged in an emergency via a network of piping and strategically located nozzles, the position and type of which have been determined by the system design. The cylinder

valves can be opened automatically – either locally or remotely – or manually using pneumatic, electric or mechanical valve actuators. Two or more areas can be protected with a single group of CO_2 cylinders by means of directional or selector valves.

On release, CO_2 discharges as a colourless, odourless, electrically non-conductive, and non-corrosive gas that quickly floods the entire protected area and extinguishes the fire. This is achieved mainly by reducing the oxygen level to less than the 15 percent necessary to allow combustion to take place. The gas also provides a measure of localised cooling.

This permeation of the CO_2 gas, coupled with it being heavier that air, makes it ideal for suppressing fires in the ducts and voids beneath raised floors that are commonly used in switchroom enclosures to house extensive cabling. This cabling can represent a significant fire hazard that may be difficult to locate, with the potential to cause serious damage if it is not quickly extinguished.

CO_2 can be compressed into a liquid state which, when maintained under pressure, requires a smaller storage footprint than many of the other gaseous suppression agents on the market. Another factor in CO_2's favour is its low cost in comparison with many alternative suppression agents. Additionally, as CO_2 has so many other commercial uses, refills are readily available throughout the world.

Local discharge

Not all fire risks lend themselves to total flooding suppression; portable extinguishers are frequently the only workable solution, and CO_2 portable extinguishers have been used successfully for many years.

This is borne out by the sheer number of fires that are extinguished every year using portables, and without the need for the intervention of the fire and emergency services. According to figures produced by Britain's Fire Extinguishing Trades Association – now merged with the British Fire Protection Systems Association to form the Fire Industry Association – portable extinguishers save the British economy alone around £500 million every year and completely extinguish around 66,000 fires. This compares with statistics from the Department of Communities and Local Government that show that the fire and rescue service in the UK attended 88,400 fires in buildings in the UK in 2006.

However, there is a tendency to view portable extinguishers as commodity products; an attitude that should be avoided at all costs. The difference between a quality extinguisher and one of somewhat dubious origin or manufacturing pedigree is, at most, a few pounds. Compare this with the portable's potential ability to immediately suppress a fire without the need to evacuate the premises, call for assistance from the emergency services, or risk damage to business critical equipment, and the cost saving plunges to the realms of the ridiculous.

So, with the proviso of ensuring the build quality and reliability of the portable extinguisher, CO_2 is an eminently suitable suppressant in many commercial and industrial situations, and is particularly suitable for use on electrical fires. IFP


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Fire alarm systems cost kept in check

By Mark Ayton

Managing Director of Gent by Honeywell

Technological advances are helping to keep the cost of fire alarm systems in check, according Mark Ayton, Managing Director of Gent by Honeywell.

With global pressure on cost at its tightest for many years with the rising price of fuel and many other commodities, the pressure is on for the fire industry to provide increasingly effective and efficient alarm systems.

Equipment for fire alarm systems is thankfully bucking the trend, with minimal changes in cost over the past 10 years.

However, the industry has not ignored related cost increases brought about through the installation process, with rising prices for copper cabling and the continuing increased cost of labour being factors which businesses have had to take into account.

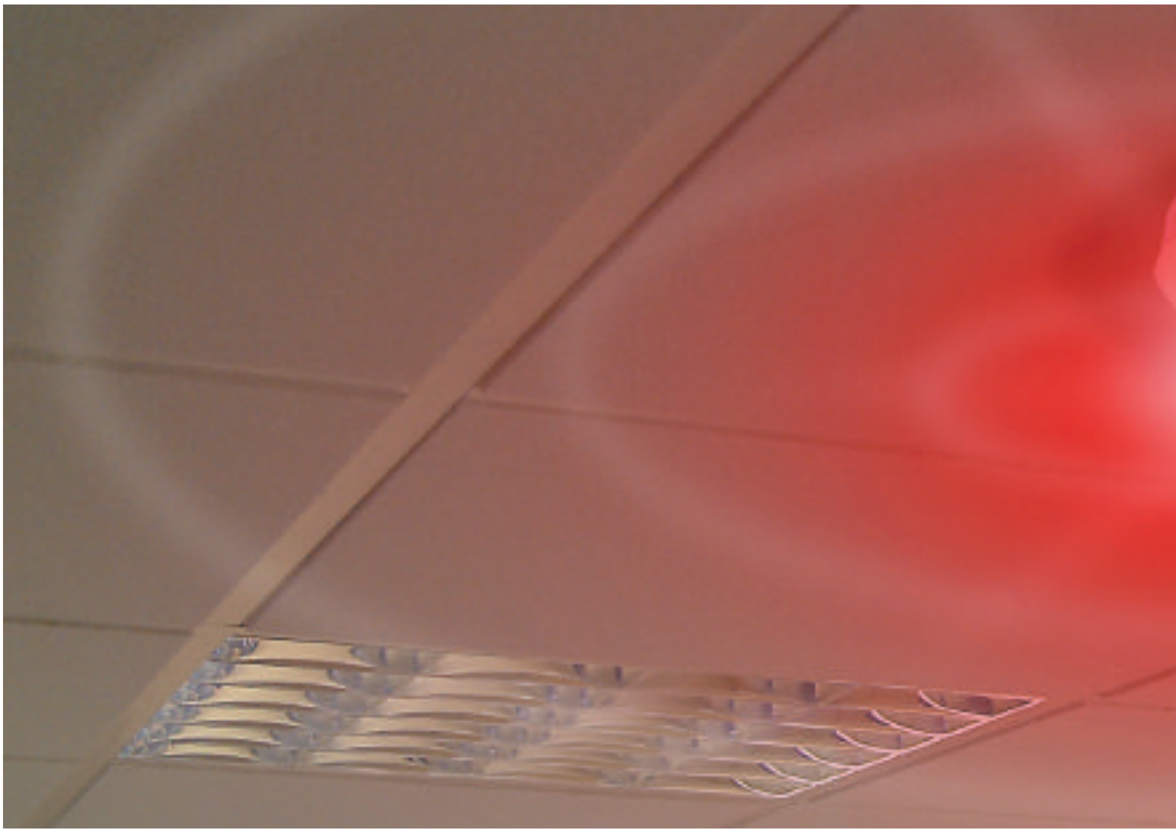
In turn, the responsibility on contractors is increasing to select the best provider and the most suitable system design to produce the best overall solution for clients.

The usual split of cost for a complete system is approximately 35 per cent for the equipment and 65 per cent for labour and installation. It is our responsibility not only to keep the amount which accounts for that 35 per cent as low as possible, but also to offer solutions to reduce the 65 per cent.

However, help is at hand. Developments in fire system innovations have actually made systems more efficient and, as a result, more cost effective. Technology can indeed save money.

Multi-functional sensors and sounders have reduced the number of devices that need to be fitted, with newer models such as the S-Quad pioneered by Gent incorporating a sensor, sounder, voice alarm and strobe all in one device.

Instead of three cables being needed to wire individual sensors, strobes and sounders, these device innovations can significantly reduce the cost of the install by requiring just one cable terminated to one device. Sensors with voice capabilities can also reduce the need for speakers and traditional voice alarm amplifiers where background music or PA is not required.



CASE STUDY: Isozaki Atea Towers, Bilbao

Gent by Honeywell is continuing its association with high profile projects in the Spanish city of Bilbao. Having installed a Gent Vigilon fire alarm network and integrated Voice Alarm system in the spectacular Guggenheim Museum, the company is now providing equipment for the Isozaki Atea Towers, designed by architect Arata Isozaki, which will be the city's tallest building and the highest residential mixed-use buildings project in the Basque Country.

The system will be supplied and commissioned by DDS, Gent's appointed international partner based in Madrid and approved distributor for the Iberian peninsular.

Atea means 'gate' in the Basque language, and the project is intended to be the new entrance to Bilbao, with two towers forming the gateway. The first of which will be connected to the nearby Zubizuri Bridge designed by the architect Santiago Calatrava.

The towers each have 22 storeys, with a total of 254 residential units divided into five different buildings. In addition 3,753 square metres will be dedicated to retail space and 1,360 square metres for office space. A centre for the elderly is also expected to be built in the future.

The total cost of this project is estimated to be €91 million, with approximately €75,000 worth of Gent fire equipment required for the first phase.

Gent was selected as the main fire detection brand with virtually the entire complex protected by Gent's Vigilon analogue addressable Fire Detection & Alarm systems.

The Isozaki Tower's fire detection and alarm system will comprise five Vigilon four-loop control panels with each loop capable of controlling up to 200 devices. A mix of S-Quad sensors, having a unique four-in-one

sensing technology, plus integral sounder, speech and strobe facilities are being used, all in compliance with the latest relevant BS/EN standards.

The building will benefit from the many advantages brought by the advanced technology incorporated into the system. False alarms are dramatically reduced by the use of a combination of detection techniques within S-Quad, the device even being capable of distinguishing between smoke dust and steam, while also incorporating integral sounder, bell and strobe.

The sounder allows for sophisticated voice messages to programmed via the Vigilon panels, allowing multi-lingual instructions to be broadcast in the event of a fire. This generally aids orderly evacuation, and even specifically allows for phased evacuation, which helps avoid panic and confusion by reducing overcrowding in exit stairwells and passages in the event of an alert.

Also, when the centre for the elderly is ultimately built, the use of S-Quads with their integral strobes will make it easier for residents to be quickly aware of an alert, even if they are hard of hearing, allowing them to evacuate more quickly in the event of an emergency.

Modern fire alarm technology can really reduce the on-site labour time, making the pressured final installation process towards the end of a building project far simpler and quicker.

False alarms are also reduced by the new devices as they enable systems to be far more flexible. If a basic sensor is causing false alarms (for example if steam is present) in a specific room, it is simple to replace that device with a more sophisticated model to provide advanced detection. Similarly, if increased audibility, a voice message or a strobe is required, then a simple device change can meet this requirement.

Modern fire alarm technology can really reduce the on-site labour time, making the pressured final installation process towards the end of a building project far simpler and quicker.

Such devices can also include a short circuit isolator to reduce disruption if faults occur, also making repair work far more straightforward.

More innovative systems such as Gent's S-Quad include these isolators in every device, maintaining 100 per cent integrity if a cable fault occurs. It also lets the contractor have the freedom to install the system in the easiest way possible, without having to consider where short circuit isolators have to be installed every time the cabling enters or leaves a zone.

Loop-powered sensors and sounders make modern systems more reliable and efficient, providing greatly increased capacity for up to 200 devices on each loop.

The move driven by the British Standards to install reduced volume in every room – as opposed to ear-splitting corridor alarms needing to reach people in several rooms nearby – creates a more even spread of alarm noise around the building.

This is possible and far less expensive than may first be apparent, as sensors in each room are now able to double up as sounders as well. As a result, up to eight devices may be provided for the same price of just one traditional sounder and its own cabling and installation.

The fire industry has been working hard to respond to the challenge of cost, meeting the requirements of the current economic climate. Innovation and technology are resulting in intelligent solutions which reduce the disruption of false alarms, give far greater alarm system flexibility and keep prices at a minimum. IFP

Mark Ayton is the Managing Director of Gent by Honeywell and has worked for the company for eight years. He is also a member of the Fire Industry Association Board.

High density su housing – Is fire

ASFP
ASSOCIATION FOR SPECIALIST FIRE PROTECTION

These days we seem to be pre-occupied with an increasingly excessive amount of jargon/buzz words, such as sustainability, zero carbon, carbon footprint reduction, renewable energy technologies, modern methods of construction (MMC) , the Calcutt Report, etc. The list goes on, but what does it mean for fire safety? After all, fire is completely oblivious to all the jargon and doesn't even speak the language.

By Bill Parlor

Technical Officer, Association for Specialist Fire Protection (ASFP)

Assuming that 'sustainability' is the key word, which interpretation should be the focus? According to my dictionary sustainability is described thus:

> ***Sustainability*** *– The ability to keep in existence, maintain, or prolong; to support from below; to keep from falling or sinking; to support the spirits, vitality or resolution; to keep up a joke or an assumed role competently; to endure or withstand, to experience or suffer (loss or injury); to prove or corroborate.*

So what is high density sustainable housing? It seems logical to assume that 'high density housing' means more housing units in a smaller space than usual. Most fires already occur in normal density housing, so does this 'high density' terminology include an increased risk from fire? For me, the susceptibility to spread of fire is clearly increased? Higher density means less spacing and higher exposure to radiation from any fire than before. In my mind, we do need to take extra measures or extra precautions in such circumstances.

Interestingly, before we proceed, in the United Kindom Approved Document B definitions include the term 'live/work unit' as a flat which is intended to serve as a workplace for its occupants and for persons *who do not live on the premises*. So this suggests that high density housing could include 'high density live/work units' too and these places may be largely unattended outside normal working hours, which is a clear opportunity for fire to start and grow unseen.

Does fire care about sustainability?

Fire will be the consquence of an ignition source in any building. If it has fuel to burn and oxygen to feed the combustion process, then it will grow until the fuel and/or oxygen is consumed or eliminated.

A sustainable fire needs to have fuel available for the combustion to continue. The FIGRA index of construction product will tell us how fast the fire can grow and if escape is still tenable. The European classifications for Reaction to Fire of the linings exposed to fire (classes A1, A2, B, C, D, E and F) are based on the fire growth FIGRA index of

stainable an issue?

the linings of the enclosure. But this underlying information has been omitted from Approved Document B, so we need to ensure that it is remembered when we stretch the limits of risk, as in 'high density'housing or 'mixed use' developments.

Modern methods of construction

The terminology seems to have been spurned by insurers, who face enhanced risks due to building methods that have no history in fire, or that include features that could well introduce significant risks.

The relatively recent tendency to the use of pre-fabricated pods is one such issue and demands that the vertical and horizontal spaces between pods include effective barriers to the passage of fire, especially where services perpetrate the spaces and penetrate the walls/floors of the pods. Without such measures, the assembly could create a perfect convection tunnel for fire spread.

To overcome these great concerns, new methods of fire test have been required by insurers to fire test the entire pod assemblies. The substitution of materials in the pod construction needs to be carefully understood and possible banned, since minor changes on cost can have dramatic consquences in fire.

In previous times, the food industry became acutely aware of the fire hazards associated with some types of combustible cored sandwich panels. So much so, that AD/B 2000 introduced a new Appendix F. Yet six years later whilst Volume II still includes a dedicated Appendix F which highlights the significant hazards and risks, the same fire guidance is missing from AD/B Volume 1 for dwellinghouses! Building methods are not limited to one sector of construction anymore!

Fire check list

If a fire occurs, what will happen in the building being considered? Is the standard guidance still relevant? Have new hazards been introduced? Have the risks been increased or overlooked? Have the fire measures been increased?

The fundamental advice is relatively simple:

- Keep fire in the box, or out of the box
- Ensure fire stays in the room of origin and cannot pass from room to room
- Ensure the walls can prevent passage of fire
- Ensure hidden spaces behind, below or over walls include adequate fire stopping so that unseen spread of fire is prevented
- Ensure fire resisting systems and fixings have not been substituted for cheaper ineffective alternatives
- Ensure fire stays outside the building and cannot enter via walls, services or roofs
- Note that 'sprinklers'cannot protect every part of a building
- Ensure the building products that have been tested for fire, are the ones being used, and are suitable for the application
- Prevent substitution of products unless relevant test evidence or rules permitting change are clearly available and relevant to what has been done
- Has the fire load of the building been increased or decreased?

The European classifications for Reaction to Fire of the linings exposed to fire (classes A1, A2, B, C, D, E and F) are based on the fire growth FIGRA index of the linings of the enclosure. But this underlying information has been omitted from Approved Document B, so we need to ensure that it is remembered when we stretch the limits of risk, as in 'high density'housing or 'mixed use' developments.

Conclusions

As for case histories, the original sustainable building was obviously the third building in the story of the Three Little Pigs. You'll remember that the three little pigs built houses from straw, sticks, or bricks. Two of the buildings proved not to be sustainable at all to the wolf's huffing and puffing (or wind?). But the other building, **which took longer to build**, survived all the huffing and puffing and proved a useful and sustainable home for the third little pig.

OK, it was about wind not fire and it was a fairy story, but it serves a point.

One last thought. Does high density housing also have a more open plan design and little barrier to fire spread? Looks good, but what stops the fire? IFP

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Claim to be Like Firetrace.
They are Not.
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+ Only FIRETRACE INTERNATIONAL has 20 years of experience with more than 65,000 systems protecting equipment worldwide
+ Only Genuine FIRETRACE SYSTEMS have the tested and proven reliability you and your customers require
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FIRETRACE®

IFP

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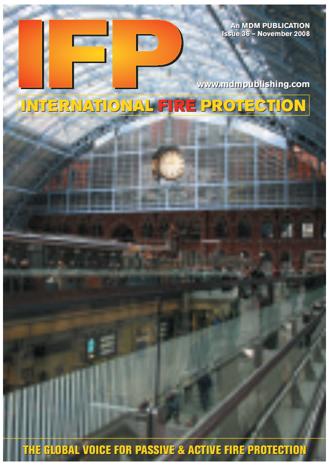
INTERNATIONAL FIRE PROTECTION

THE GLOBAL VOICE FOR PASSIVE & ACTIVE FIRE PROTECTION

November 2008
Issue 36



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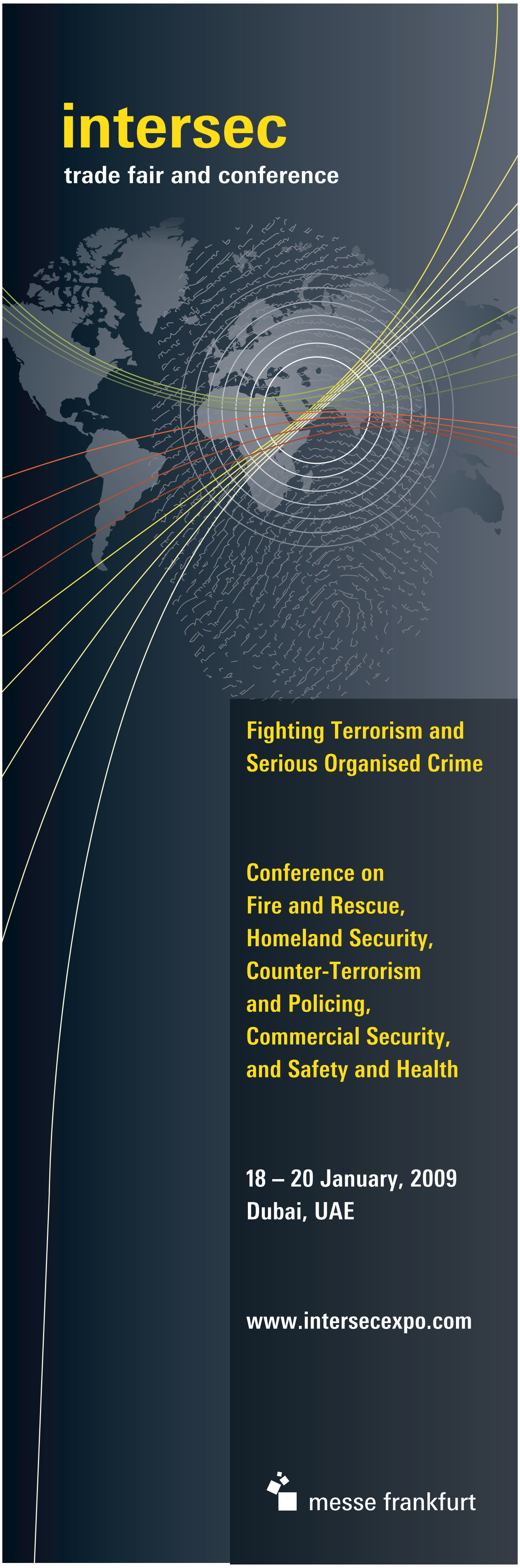
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The cat's whiskers
Established in 1993 Cranford Controls has grown from strength to strength to become a leading UK independent manufacturer of fire safety and security products, supplying to over 35 countries worldwide.
Cranford Controls also distributes a vast selection of products including door retainers, power supply units, call points and Intrinsically Safe products, to add to their ever-growing product portfolio of sounders, beacons and sounder/beacons; enabling Cranford Controls to offer a solution to all facilities.
On top of this, all of their product range has various approvals including VDS, EN54 and Rohs and Weee.
CRANFORDCONTROLS™
FIRE & SECURITY
Why not call us on...
T: +44 (0)1420 592 444
F: +44 (0)1420 592 445
or find us at www.cranfordcontrols.com

A real discovery in fire detection

The Discovery range of intelligent fire detectors from Apollo Fire Detectors Limited has been specifically developed to meet two key market demands: adaptability to changing conditions and protection against unwanted alarms.

Discovery Detector Group: Discovery has been specifically developed to meet key market demands

Evolved from the proven technology behind Apollo's acclaimed XP95 range, Discovery gives specifiers and users five panel-selectable bands, inbuilt drift compensation, a non-volatile memory and fail-safe operation. The range comprises ionisation and optical smoke detectors, a heat detector, a mulitsensor (combined smoke and heat) detector and a manual call-point. There is also the Discovery Carbon Monoxide (CO) fire detector, which is good at detecting deep-seated fires and requires only very low power.

Each detector in the Discovery range can operate in one of five response modes, any of which can be selected from the control panel. Each mode corresponds to a unique response behaviour, which can be broadly related to sensitivity to fire. Whatever the type of detector, mode one will give higher sensitivity to fire than mode five. Therefore, Discovery detectors set to mode one will be most suitable for environments in which sources of unwanted alarms are rare, for example cleanrooms and computer suites. At the other extreme, response mode five will be suited to more dusty or smoky environments such as loading areas where diesel forklift trucks are operating. Response mode three is a general-purpose setting.

While the ability to select different levels of sensitivity dependent on environmental conditions makes Discovery fire detectors particularly adaptable, it is arguable that the inclusion of a multisensor in the range does the most to combat false alarm incidents.

Equipped with an optical smoke and thermistor temperature sensor, Discovery multisensors can be programmed to operate as a smoke detector only, a heat detector only, or as one of three combinations of both. If an 'in combination' selection is made, the signals from each sensor are considered in relation to each other. This allows protection during fire verification and is also proving useful in theatres where special effects such as dry ice could cause false 'smoke' readings.

At the 13,000-seat National Indoor Arena (NIA) in Birmingham, Discovery multisensors were specified to minimise unwanted false alarms being caused by the multi-use nature of the building. With regular use of pyrotechnics and diesel-powered equipment, as well as full catering and merchandising facilities, the NIA's fire system needed to provide protection to the main four storey building as well as its four linked multi storey car parks. BDS Fire & Security, who won the NIA contract, used an Advanced Graphics package to switch groups of multisensors between different operating modes in a pre-set sequence to take into account the varying fire detection requirements of the building at different times of day.

The Discovery multisensor is certified to EN54 standard in every one of its five operating modes and its reliability in the field in reducing nuisance alarm incidents has been proven over several years. Due to this proven reliability, it is becoming the fire detector of choice in applications where sleeping risks are a primary concern, such as nursing homes, hospitals and student accommodation. For example, more than 700 Discovery multisensor detectors were recently installed to protect Phoenix Court, a new luxury student village with 277 residents that forms part of Bristol's £500 million Cabot Circus retail and leisure redevelopment.

Apollo continues to refine the Discovery range to meet changing market requirements. A Sounder Beacon Base, which combines audible and visual alarms plus isolation in a single unit, is the latest addition. The new device makes system design and installation simpler by eliminating the need for multiple warning devices. The sounder and beacon can be set independently for maximum flexibility, with volume and tone settings selectable from the control panel. For ease of commissioning, the volume can be adjusted locally using a magnetic wand. The device offers 15 tone pairs of fire and non-fire warnings, including an electronic bell for signalling classroom changes. A low volume range is also incorporated – perfect for use in hospitals and nursing homes. IFP

For more information on Discovery, please visit:
www.apollo-fire.co.uk

Signet's integrity voice alarm calls the shots at Aldershot FC

SigNET's revolutionary Integrity voice alarm system is the powerful new force behind the life safety systems at Aldershot Football Club.

Installed by top audio specialist company, Intek Electronics, Integrity functions as a fully integrated voice alarm (VA), public address (PA) and background music (BGM) system. In the event of an emergency situation, the system provides a complete crowd warning system to effectively evacuate the 7,100 capacity ground.

Combining a voice alarm system with a high specification public address system, the six-zone fully contained life safety system features 48 powerful speakers. Pre-recorded messages are stored in a digital message store and volume levels can be set differently in each zone for emergency announcements, ordinary paging and background music.

Fully compliant with BS5839 Part 8, BS7827 and BS-EN60849, Integrity's unique PC software enables a VA/PA system to be designed and demonstrated prior to purchase. Its capacity for all cause and effect scenarios to be tested and auditioned gives stadium/site management unrivalled confidence and control over site evacuation strategies.

Says Steven Wakefield of Intek Electronics: "Integrity fulfills all requirements of British standards relating to VA systems in sports stadiums and is a truly exceptional product. I would recommend it to any serious installer, particularly one looking to install a life safety system at a sports stadium."

Continues Steven: "Key to our specification of Integrity was the fact that it is manufactured in the UK by a British company. Not only does SigNET design and manufacture the highest standard of life safety equipment but also provides exemplary technical training, advice and after-sales support. The service we received throughout the project – from purchase right through to commissioning – was second to none".

Affectionately known as 'The Shots', Aldershot Town is one of the UK's up-and-coming football clubs. Recently promoted to the Football League, the Club has secured a major sponsorship shirt and stadium name deal with leading UK paper distribution company, EBB. The Ground is now known as the EBB Stadium and boasts VIP hospitality facilities and refreshment areas.

Aldershot FC is just one of Intek Electronics prestigious projects. As one of the UK's leading audio specialist companies, Intek Electronics has undertaken a number of impressive contracts worldwide including installations and servicing for the Po Na Na Group PLC, David Lloyd Leisure PLC, Morland PLC, Bass Taverns, BS Group PLC, Poole Greyhound and Speedway Stadium and Bournemouth International Centre.

For more information please contact:
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C-TEC
Tel: +44 (0) 1942 403810
Fax: +44 (0) 1942 829867
Website: www.c-tec.co.uk

High hazard energy environment

Kentec safeguards interior of Geothermal Power Plant in Iceland

KENTEC are the power behind Iceland's geothermal energy. Fire alarm control panels from Kentec have been chosen for a new Geothermal Power Plant, currently under construction south of Iceland's Mount Hengill for Orkuveita Reykjavikur (Reykjavik Energy), and designed to meet the increasing demand for electricity and space heating in Reykjavik. When completed next year, this latest phase of the plant will give access to geothermal fields up to 5 kilometres below the surface and generate 300 MWe of electricity, and 400 MWth of thermal energy via steam transmission for Reykjavik's district heating system. Such a vast project, with its attendant risks as a high-hazard environment, demands the highest standards of reliability and integrity in monitoring and control of the prevailing conditions of the plant. That's why the specifiers, Iceland's Ark Security, selected Syncro two-loop open protocol fire alarm control panels from Kentec for interfacing with the plant's smoke detection system, based on Hochiki's ESP – Enhanced System Protocol – analogue addressable devices. Ark Security's Kjartan Scheving comments: 'Essentially, the specification of Kentec's Synchro panels was determined by the way we can so easily and rapidly configure a system with Kentec's intuitive Loop Explorer software. The simplicity of its graphical programming de-mystifies the process of configuring complex fire systems. What's more, the expandability and flexibility of Syncro control panels means networking is very straightforward. In the longer term, integration to much larger systems can be achieved easily, if the need arises, therefore providing a future proof solution for any installation.' With its large graphical display and ergonomic button and indicator layout, the Syncro control panel can be very quickly customised by installers, commissioning engineers and end users alike.

For more information please contact Kentec on 01322 222121, email robine@kentec.co.uk or visit www.kentec.co.uk

A Beam Detector for all Installations

When it comes to optical beam smoke detectors it is vital that the correct beam type is selected for a specific application. No other company has the experience, or the product range, of Fire Fighting Enterprises Ltd. With well over 600,000 beams installed, including in some of the World's most prestigious buildings, it is clear that the FireRay series of projected beam detectors is the model of choice for both installers and specifiers.

The model range comprises:

The FireRay 2000 end-to-end beam detector, a well-established product noted for its ruggedness, small detector head size and low level control. The small size of the transmitter and receiver mean that it is ideally suited to projects where a low visual impact is required, such as buildings of historical importance. The FireRay 2000 has CPD, EN54 and UL certification plus others. A typical installation is Hong Kong International Airport where the beams do not interfere with the stunning Norman Foster design.

The FireRay 50/100 reflective beam detectors were amongst the first purpose built reflective products. The big advantage with this product is that both the transmitter and receiver are in the same discrete unit, which reduces the amount of cabling required thus saving time and significantly reduces installation costs. The FireRay 50/100 reflective has CPD, EN54 and UL certification plus others. This beam has been used in many prestigious locations including the British Museum and the Foreign Office in London.

The FireRay 2000 Eexd is the only ATEX 94/9/EC certified beam detector available. Its flameproof construction and robust housing make it particularly suitable for use in hazardous locations where other types of smoke detection would be unsuitable. Typical applications are oil refineries, petrochemical plants and warehouses for the storage of flammable liquids. These beams have been successfully used in ordnance bays in the Falkland Islands and in some marine applications.

The new flagship model of the range is the innovative FireRay 5000 Auto-Aligning Infra-Red Optical Beam Smoke Detector. This is a completely new design incorporating pioneering technology that addresses the needs of both user and installer. Key features include: Easifit First Fix system; LASER assisted alignment, *AutOptimise* automatic beam alignment and a 2-wire interface from the detector to the controller. The FireRay 5000 boasts certification from UL in addition to LPCB, VdS, CPD & EN54:12, with more international approvals on the way, and is protected by British Patent Application 2426323 and by International Patent Application PCT/GB2006/1799 pending. IFP

Further details can be found on our website:
www.ffeuk.com

Cranford Controls grows from strength to strength

Since their establishment in 1993 CRANFORD CONTROLS has grown from strength to strength to become one of the world's leading suppliers of fire, security and ancillary devices; with their rapid delivery times out-shining the competition. Cranford Controls is based in Alton, Hampshire, UK where their products are manufactured within their custom built facility approved to ISO9001 by VDS.

The building is also equipped with an anechoic chamber enabling specialised in-house testing.

Cranford Controls is committed to the development of new, reliable and futuristic products and has a dedicated research and development team completely focused on finding solutions for the ever expanding industry requirements.

The Cranford range includes various sounders, beacons, sounder / beacons, door retainers, power supply units, call points and Intrinsically Safe equipment, with assorted products available in a spectrum of colours, outputs and voltage requirements. The products also come equipped with various approvals such as VDS, EN54 and RoHS & WEEE.

The aesthetically pleasing looks of the entire Cranford product portfolio, combined with the uniform sound throughout and the vast and varying product selection they have to offer the market, has ensured an ever growing and dependable client base across the world.

Even though their main focus lies within the conventional sector Cranford products have been designed with flexibility in mind. Cranford Controls understands that end users may wish to use their products within addressable systems or within the security sector and have designed their units to reflect this, allowing for easy adaptation by customers.

For further information on how Cranford Controls could help you please call the sales team on +44 (0) 1420 592444 or email sales@cranfordcontrols.com

CRANFORDCONTROLS™
FIRE & SECURITY

Keyswitch, push button and rocker switch activation devices

KAC, global leader in the break glass call point sector, also offer the popular Class 9000 family of actuation devices that feature a wide variety of different operating mechanisms. The Class 9000 units have numerous applications across the fire, security, machine operation and other industries where manual control of specific operations is required. The various options within the family enable operation with or without security restrictions.

The keyswitch units are available as two and three position devices and provide protection against unauthorised operation with removable keys. They control two independent circuits; in the two position versions one circuit is open while the other is closed, turning the key reverses these positions. In the three position version both circuits are normally open, either one is closed depending on which way the key is turned. As a further refinement, the key can be removed in either one only or both positions for the two position keyswitch, in the three position version the key is removable in all three positions.

The push button units are double pole and available as either momentary action, with the circuit completed only while the button is pushed, or as latching units that toggle between the open and closed state on successive operations. The two or three-position rocker switch units are available as two position double pole on/off switches, or three position double pole on/off/on devices with all switches rated at 230VAC.

All units are available with red, green, white, yellow and blue bodies and in a choice of flush or surface mounting variants.

For further information please contact: Mark Thomson, KAC Alarm Company
Tel: + 44 1527 406655 Fax: + 44 1527 406677
Email: sales@kac.co.uk Website: www.kac.co.uk

Dr Sthamer – Hamburg launches new environmentally friendly Alcohol Resistant Fluorine Free foam

DR STHAMER – HAMBURG, has launched at the Fire Service College, Morten in Marsh, their latest development, Moussol FF 3/6.

A revolutionary new Fluorine Free alcohol resistant fire fighting foam, the foam has been specifically designed to answer the calls for an environmentally friendly foam which does not contain Fluoro-Surfactants.

The foam can be used at 3% induction rates for Hydrocarbons and 6% for Polar Solvents, it has been certified to EN1568 parts 1, 3 and Part 4 with a rating of 1A/1B.

It can be used with all types of foam making equipment, Monitors, Branchpipes, over the top pourers, etc.

Moussol FF 3/6 can be used with fresh, salt, brackish and recycled process water.

This latest addition to the Dr Sthamer-Hamburg arsenal underlines the company's commitment to remaining at the forefront of Fire Fighting Foam development.

For more information please contact:
Jan Knappert, International Sales Director
Tel: +44 (0)7795 101770 Email: jknappert@sthamer.com
Website: www.sthamer.com

Burning questions, brilliant solutions

Pilkington's commitment to fire safety

By Mike Wood

of Pilkington

Product range snapshot

Pilkington **Pyrostop**™

A high performance insulation and integrity fire-resistant glass that provides classification times ranging from 30 minutes up to 180 minutes. Varied applications and a wide functional range by combining Pyrostop with the Pilkington range of other glass types including vertical, horizontal and inclined.

Pilkington **Pyrodur**™

An integrity glass based on the same intumsecent laminated technology as Pyrostop. Provides classification for 30 and 60 minutes at the CEN E and EW levels, and provides the bonus benefit of insulation (EI) for 15 minutes. Widelu used in partitions, doors, vision panels and overhead glazing.

Pilkington **Pyroshield**™

A well established and robust basic integrity glass with an extensive record of volume use over decades. Provides 30 and 60 minutes classification, and even capable of 120 minutes in special glazed systems.

Note: the Pilkington range has achieved appropriate CE marking certification. Details accessed from: **www.pilkington.com**

Also access test summaries from **www.pilkington.co.uk/specifire** or via email Pilkington@respond.uk.com or phone on 0044 (0)1744 69 2000

Traditions in fire safety

Pilkington have a long tradition of focused commitment to fire safety, stretching back to the 1880's when wired glass was first introduced. Today's polished wired glass (Pilkington Pyroshield) is still the world's simplest and most widely used fire-resistant glass. Its function is robust and effective. In fire the glass cracks but the wire mesh within the glass effectively holds the glass together. The best testament to the tough "no nonsense" effectiveness of wired glass in fire is that it is the thinnest fire-resistant glass (only 6mm) that can effectively resist the stringent examination set by the US hose stream test – a 30 psi (207 KPa) pressure full on hose stream played over the hot fire-exposed surface at the end of the test. There is no other fire-resistant glass like wired.

No nonsense fire protection

Pilkington has also led the way with high performance clear fire-resistant glass. Pilkington Pyrostop (fire insulation and integrity) and Pilkington Pyrodur (integrity) were introduced in the 1970s and now have more than 30 years' experience of use and testing. They continue to be trendsetters. Applications include doors, partitions, compartment walls, façade glazing, roofs and even integral loadbearing fire-resistant glass floors (using both steel and timber frames). Fire test classification times range from 30 or 60 minutes to more challenging exposure of 90, 120 and even 180 minutes if required. That shows the high degree of flexibility and capability of the technology.

The excellent protective action provided by Pilkington Pyrostop (and, on a different scale, by the integrity glass Pyrodur) is due to the sandwich construction of the glass: layers of silicate glass are laminated with intumescent fire-resistant layers of solid water glass to form a single robust composite. If a fire breaks out, the layer of glass facing the fire fractures first, causing the adjoining fire-resistant layer to foam up, absorb the fire's energy and release cooling water vapour. The glass turns opaque, effectively blocking out the fire. This process continues progressively layer by layer, and therefore under control, ensuring that resistance to fire, heat and smoke are maintained throughout. The intumescent technology is a reliable one that has stood the test of time, and one that has been exploited and developed for a wide variety of applications throughout modern buildings.

Tried, tested, trusted

Pilkington Pyrostop provides a high level of insurance against the effects of fire – that is against smoke, flames, fumes, and heat transfer by all mechanisms. Pilkington Pyrodur is primarily classified as an integrity glass, but it also punches above its weight: the intumescent interlayer also provides a level of insulation for at least 15 minutes, with very low levels of transmitted radiant heat for the remainder of the test time.

The fire-resistant properties of all Pilkington products have successfully undergone numerous trials and fire exposure tests carried out by neutral examination centres world-wide. Large internal test furnaces are also kept busy monitoring and controlling on a daily basis. During 30 years' practical experience that's a lot of testing. The protective performance has also been confirmed in actual fire situations where the formation of a fire barrier by Pilkington Pyrostop has prevented the spread of fire damage and allowed escape and rescue routes to be used without danger. Pyrostop has even been de-glazed and fire tested after 20 years' in use: performance was exactly as intended, as good as the original fire tests.

Key Pilkington watchwords for their fire-resistant glass range are consistency, reliability, and repeatability. Fitness for purpose for working in such a challenging environment as fire is absolutely critical. Risks have to be minimised. And it is therefore fundamentally essential that the fire-resistant technologies are tried, well tested and above all trusted. IFP

A Modern Fire Fighting Training Center in Egypt

BAVARIA EGYPT, a pioneer firefighting equipment manufacturer in Germany and Egypt, has established a modern training center at the new industrial community "10th Ramadan City", about 50 km north-east of Cairo, Egypt.

The Center training programs are designed to cover a wide range of fire protection and fire fighting skills, along with OHSAS management programs. The training center offers two main advantages. The first is the diversity of training levels, starting from first-aid response to fire incidents, up to firefighting and fire prevention planning. The second is the use of modern training techniques such as simulation. Simulators are widely used in the training programs, a feature which is not common in the region.

The center emphasizes on enhancing skills of the trainees in operating light and heavy firefighting equipment. Live fire fighting training using portable fire extinguishers on real size dummies are one of the most demanded trainings for many institutions since this training significantly helps in building up an effective first line of defense from every employee. Also, training on heavy equipment, water foam fire fighting trailers and firefighting water pumps are widely available. Furthermore, evacuation and over draft fire trainings is also another feature of the Center's activities.

Fire Prevention in the oil and gas industry acquires no small portion of the Center's time, as fire security measures are essential for preventing incendiary fires. The Center is also now offering a new training program on security in oil facilities.

Bavaria Fire Training Center provides a well developed wide range of training programs on fire safety and related issues, hardly covered by conventional training facilities in the Middle East.

For more information please contact:
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Fax: +20 2 26631 550
Email: info@bavaria.com.eg
Website: www.bavaria.com.eg

New guide covers central battery solutions for emergency lighting

COOPER LIGHTING has published a new 128-page full-colour guide to central battery solutions, which will be an invaluable aid for anyone involved in designing emergency lighting systems.

Starting with an overview of the benefits of central battery technology, the guide then moves into a detailed section covering system design and planning.

This is followed by comprehensive product information on the Menvier range of central battery systems, as well as Menvier and JSB slave emergency luminaires.

Also included is an updated version of Cooper's 7-stage emergency lighting design guide, together with emergency lighting spacing tables and a useful glossary of terms.

The Central Battery Solutions guide can be obtained by calling the literature hotline on 01302 303200, emailing a request to info@cooper-ls.com or by visiting www.cooper-ls.com

Firetrace protection for critical asset "micro environments"

Firetrace International's FIRETRACE® is an automatic fire suppression system that is cost-effectively protecting 75,000 pieces of business-critical equipment around the world. It is providing reliable unsupervised protection that is stopping fires before they can do expensive and possibly irreparable damage to vital enclosed equipment such as production machines, electrical cabinets, machinery housings, wind turbines, engine compartments, fume cupboards, IT servers and a wide variety of technical systems.

Being housed in some form of micro-environment enclosure, these assets are isolated from a facility's main fire detection and alarm installation. The result is that, by the time a remote detector or sensor has been activated, the enclosed asset is virtually certain to be engulfed in flames and extensively damaged, if not destroyed. FIRETRACE resolves this challenge by providing around-the-clock protection where it is needed – inside the enclosure, where it can react the instant a fire breaks out. It is an automatic "self-seeking" system; a stand-alone solution that is entirely self-contained that does not require an external power source.

The UL (Underwriters Laboratories), FM (Factory Mutual) and NFPA (National Fire Protection Association) certified system comprises an extinguishing agent cylinder that is attached to proprietary Firetrace Detection Tubing via a custom-engineered valve. This small-bore polymer tubing is a linear pneumatic heat and flame detector that was specially developed to deliver the desired temperature-sensitive detection and delivery characteristics. It detects along the entire length of the tube, so the FIRETRACE tubing quickly detects a fire at its source, ruptures and automatically releases the suppression agent, extinguishing the fire precisely where it starts and before it has had time to take hold.

The flexibility of the tubing means it can be easily threaded around tightly-packed compartments and components, so is able to contend with the often complex interiors of these micro environments. A wide selection of suppression agents is available, the choice being dependent upon the characteristics of the fire hazard and any environmental considerations. The current offering includes clean agents such as 3M™ Novec™ 1230 Fire Protection Fluid and DuPont™ FM200®. Other options include foam, carbon dioxide and dry chemical suppressants.

FIRETRACE systems can be configured for either direct release or indirect release, and are available as either a low-pressure or high-pressure system, depending upon the choice of fire suppression agent, the type of enclosure and the particular fire hazard, and is best determined in consultation with one of Firetrace International's authorised FIRETRACE distributors. These FIRETRACE-trained professionals will advise on hazard analysis and suppression agent and system selection, as well as carrying out the installation and commissioning.

Briefly, the Direct Release System utilises the FIRETRACE tube as both the detection device and the suppressant delivery system. If a fire breaks out, the tube ruptures nearest the point where the most heat is detected, forming an effective spray nozzle that releases the entire contents of the cylinder to suppress the fire. The Indirect Release System is typically used in larger areas requiring a higher volume of extinguishing agent. It uses the FIRETRACE tube as a detection and system activation device, but not for the agent discharge. The rupturing of the tube results in a drop of pressure causing the indirect valve to activate. This diverts flow from the detection tube and the agent is discharged from the cylinder through diffuser nozzles, flooding the entire enclosure.

However, it is important to ensure that what is being installed is genuine FIRETRACE from ISO 9001-approved Firetrace International's global network of authorised distributors, as FIRETRACE has a number of imitators that offer inferior products lacking any form of testing, third-party accreditation or approval. Details of these authorised FIRETRACE distributors are available by contacting Firetrace International at info@firetrace.com. IFP

Further information on FIRETRACE is available from: the **FIRETRACE EMEA head office** in the UK on +44 (0) 1293 780390, or from Firetrace International headquarters in Scottsdale, Arizona on +1 480 607 1218. The company's website is at www.firetrace.com

New i3 advantage™ inert gas system cuts installation costs

The new HYGOOD® i3 ADVANTAGE™ inert gas fire protection system from Tyco Fire Suppression & Building Products provides installers and end users with significant and measurable savings, while meeting all of the environmentalists' demands. It incorporates unique HYGOOD patented constant-flow valve technology that significantly enhances the system's performance by eliminating the need for high-pressure pipework, reducing the requirement for room venting, lowering installation costs and reducing room turbulence on agent discharge.

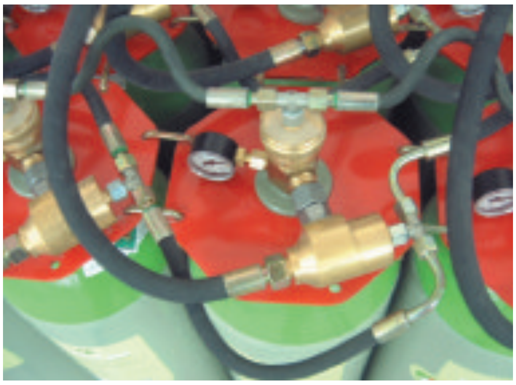
The cost impact of this new technology is that i3 ADVANTAGE offers overall installed cost savings when compared with a typical "standard discharge" high-pressure inert gas system.

Like the original HYGOOD i3 total-flooding system, i3 ADVANTAGE uses a 50:50 mixture of two naturally occurring gases – Argon and Nitrogen – and so is a truly sustainable "clean" fire suppression technology with a non-toxic, non-corrosive, odour-free, zero ozone depleting, zero atmospheric lifetime and zero global warming profile. It is fast acting and has a low life-cycle cost; it is electrically non-conductive and has no breakdown products or residue, so there is no risk of damage to sensitive equipment.

A "standard discharge" high-pressure inert gas system is characterised by its distinctive spike or peaking on agent discharge. This is normal for most of the inert gas systems on the market that, although complying with the British and international standard BS ISO 14520 (Gaseous fire-extinguishing systems) and BS EN 15004 (Fixed fire-fighting systems. Gaseous extinguishing systems), results in excess pressure that calls for costly high-specification pipework and over-pressure venting to ensure that the protected room or enclosure pressures are kept to acceptable levels.

By comparison, the innovative constant-flow valve technology incorporated into the new i3 ADVANTAGE eliminates this pressure peak, achieving a constant, more even agent flow during the entire discharge period. There is lower pressure throughout the pipework system and the constant, reduced flow into the protected enclosure lowers the over-pressurisation effect common in standard inert gas systems, and reduces the size of the over-pressurising venting required in the enclosure.

The i3 ADVANTAGE system uses 80-litre steel containers that are filled with compressed i3 gas at 300bar. Installations comprise one or more i3 containers that are connected to a system of pipework. These containers can be stored remote from the protected area and a bank of containers



can be used to safeguard more than a single room or enclosure. The containers meet the requirements of TPED (Transportable Pressure Equipment Directive) and, when the system is activated, the i3 gas is discharged to achieve the specific discharge time and concentration to flood the entire protected enclosure. These are calculated using the special i3 ADVANTAGE design software.

The easy to use i3 ADVANTAGE flow calculation software is a special Windows-based system developed for engineers to ensure fast and accurate enclosure protection design that is in accordance with ISO 14520 and EN 15004. Familiar navigation menus enable site survey data to be entered effortlessly. It shows tabulated concentration and oxygen levels in the protected area, plus it has the ability to generate a comprehensive bill of system materials for the installation. Design drawings can be generated in both isometric and plan-and-elevation formats, and the files can be made available in pdf format for hard-copy printing or emailing.

A number of installations have already been completed or are currently under way in the UK and Ireland, where i3 ADVANTAGE has been certified as complying with all of the relevant standards. The approvals process in other territories is in hand and is expected to be announced shortly. IFP

Further information on i3 ADVANTAGE is available from:
Tyco Fire Suppression & Building Products by telephone on +44 (0) 161 875 0400, by fax on +44 (0) 161 875 0490, or via email at marketing@tyco-bspd.com

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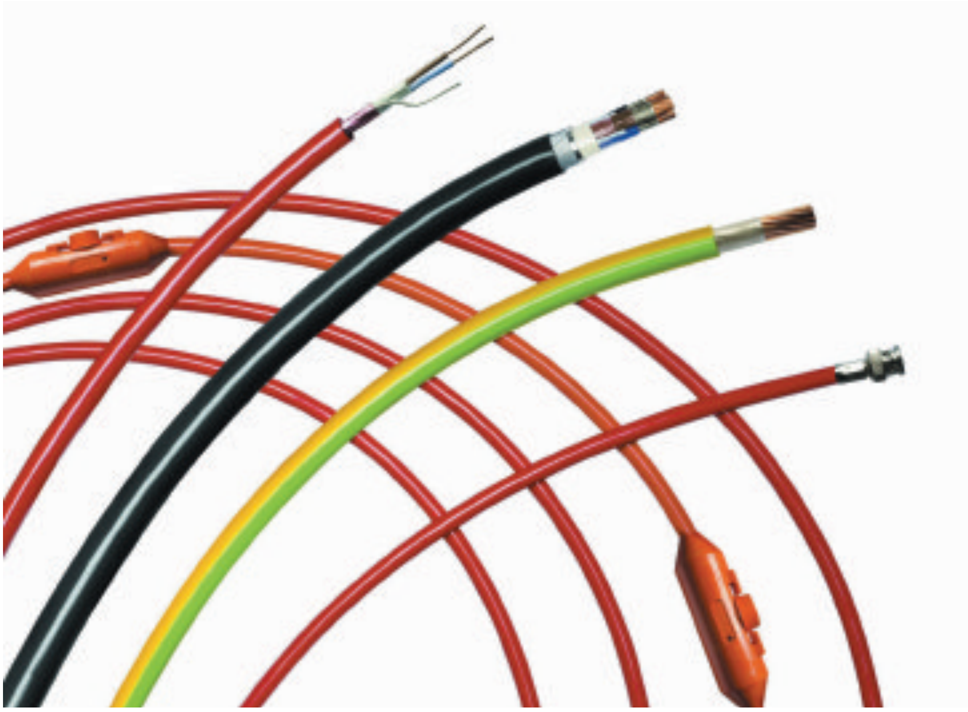

Draka cables protect Europe's premier rail project

High-performance cable manufactured by Draka UK is ensuring that essential power is reliably supplied to the tens of thousands of fire detection and emergency lighting devices that are safeguarding the rejuvenated St Pancras International station in London and the northern extension of the new high-speed rail link between London and Paris. Here, Kevin Morris, Draka's Business Development Executive, describes what he says is an installation that truly defines fire safety cabling.

By Kevin Morris

Business Development Executive, Draka

By any standards, the completion of the HS1 – High Speed 1 – rail link from Folkstone to London, the revitalisation of St Pancras International station and the construction of new stations at Ebbsfleet and Stratford is a major feat of engineering. It undoubtedly pushed rail engineering science to its limits. The final part of this £5.8 billion scheme was the northern extension, or Section Two, which completes the new HS1 – known as the Channel Tunnel Rail Link until November 2007 – from Ebbsfleet near Dartford in north Kent to St Pancras.

The project was designed and managed by RLE (Rail Link Engineering), a consortium of Arup, Bechtel, Halcrow and Systra. CORBER – a consortium of Costain, O'Rourke Bachy and EMCOR Rail – was responsible for the construction. EMCOR Rail, a part of EMCOR Drake & Scull, was the M & E contractor for the entire project with responsibility for the design, procurement, installation, testing and commissioning of engineering services throughout Section Two. This included the mechanical, electrical, public health, communications, fire detection and alarm, voice alarm, public address, security and fire protection installations.

The extensive fire safety solution was undertaken by the Infrastructure and Rail Services division of EMCOR. This covered St Pancras International station, where the world famous "Barlow Shed", in its time the largest enclosed structure in the

world, was extended to more than double its length to accommodate the 18-carriage Eurostar trains, each of which is 400 metres long. It also included the new Ebbsfleet International Station, south of the Thames, and the new Stratford International Station near the City and Canary Wharf that is central to the 2012 London Olympics transport strategy. It also took in three new twin-bore tunnels, 29 ventilation shafts at approximately 3km intervals along the tunnels, and a number of technical buildings.

The division's Safety Critical Systems team was led by Peter Patrick, head of EMCOR's fire division and a widely acknowledged expert at undertaking major infrastructure capital projects. On this contract he managed four project managers, five commissioning engineers and more than 50 electricians, and was responsible for system design and product selection, installation, testing and commissioning.

His demands were uncompromising. He says: "The most sophisticated fire detection and alarm system will count for nothing if it is not provided with continuous and reliable power. So, potentially, thousands of lives and £millions of assets are put at risk by specifying anything other than the best available fire-rated cables." He continues: "By specifying Draka cable we took chance out of the equation. The company's manufacturing and quality control, and its rigorous testing regimes are backed-up by third-party approvals. I would settle for nothing less."

In total, Draka supplied in excess of three-quarters of a million metres of cable, utilising Firetuf Connecta, Firetuf Standard and Firetufplus Enhanced cables. These fire-rated 0HLS – Zero Halogen, Low Smoke – cables are collectively being used to supply dependable power to the fire detection and alarm, voice alarm and public address systems at St. Pancras, Ebbsfleet and Stratford stations, fire detection and alarm systems in the three new tunnels, the ventilation shafts and portals, and lighting throughout the tunnels.

The decision to specify 0HLS cables is significant, particularly bearing in mind the huge number of passengers that use Eurostar every day. A key feature of 0HLS cables is that they do not emit halogen gases and burn without producing large

amounts of dense smoke. By comparison, under fire conditions, the standard PVC cables used widely in the construction industry emit hydrogen chloride gas, which has a suffocating odour that is detectable in even very low concentrations. Burning PVC cables also generate hazardous volumes of debilitating or disorientating smoke that can easily increase the likelihood of panic and make safe evacuation much more difficult to achieve.

Tunnel cable solution

The Firetuf Connecta system is specifically designed for tunnel lighting and power applications, and more than 100km of Connecta cable, incorporating no fewer than 5,000 factory-fitted sockets, was used throughout the three tunnels. This was the largest single Firetuf Connecta installation to date.

These tunnels comprise 22km of 7.15-metre diameter twin-bored tunnels, the 3km Thames Tunnel under the River, and the 19km London Tunnels deep beneath East London from Islington to Dagenham. They pass through some of the most densely populated, heavily-developed land in the world; beneath 2,600 properties, seven miles of surface railway, 12 existing tunnels – including four London Underground stations – and 600 gas, water and sewage pipelines.

The Connecta cable was supplied via Custom Design Group in Cwmbran, Draka's Connecta partner, in a variety of precise predetermined lengths between factory-fitted moulded Connecta socket outlets. Secondary outlets to individual appliances were taken from the primary cables via moulded Connecta plugs. This ensured the fastest possible cable installation on the project; it minimised the site labour requirement, and helped to

reduce the overall project timescale. As Connecta installations require minimal maintenance, the solution is also confidently expected to make a significant contribution towards reducing Network Rail's ongoing maintenance and servicing costs.

The decision to select Connecta for the project was also motivated by EMCOR's commitment to fire safety, and its determination to install only the finest quality, third-party approved cable, to ensure circuit integrity under fire conditions. Thanks to Firetuf Connecta's superb fire performance, lighting in the HS1 tunnels will continue to function if any section of the circuit is involved in a fire. Firetuf Connecta is fully approved to BS 6387: 1994, in particular the C, W and Z test that is used to determine if a cable is capable of maintaining circuit integrity under different fire conditions.

Enhanced protection

The tunnel ventilation shafts – some as deep as 54 metres – also serve as emergency access and escape routes, and their fire detection and alarm equipment is fed by Draka's Firetufplus cable. This is a BS 5839: 2002 compliant Enhanced-grade cable that offers superior pliability, robustness and flame retardancy, and provides 60 minutes of fire and mechanical protection, followed by 60 minutes of fire, mechanical impact and water protection, exceeding the requirements of Clause 26.2e of BS 5839. This ensures that the electrical circuit's integrity is maintained, even in the event of a fire. The BASEC (British Approvals Service for Cables) and LPCB (loss Prevention Certification Board) approved Firetufplus cable also satisfies the requirements of BS 7629,

The same superior performance cable is used throughout St Pancras, Ebbsfleet and Stratford stations for the fire detection and alarm systems and the stations' public address systems.

At St Pancras, now one of the largest transport hubs in Europe, Firetufplus links the station's 14 Kentec Electronics' Syncro control panels and repeaters controlling a total of 5,000 Hochiki analogue addressable optical smoke sensors, multi-sensors, heat detectors, audio visual devices and base sounder beacons. The installation takes in the world-famous "Barlow Shed" train shed arch that spans 73 metres and is over 30 metres high at its apex. It covers every one of the 13 platforms, six of which are around one kilometre long and are devoted to international Eurostar services.

The cable features a pressure-extruded sheath construction that provides greater protection than Standard-grade cable in the event of fire. It incorporates spark-free cores and a 100 percent cover electrostatic screen. Cable termination and installation is quick and easy, using 0HLS nylon or brass stuffing glands. The cable's pliability also makes life easier for the installer, as does the fact that it is available in long lengths.

However, selecting Draka cable turned out to offer the project more than technical excellence, as Peter Patrick explains: "At one stage in the contract, three days before a planned Easter holiday weekend opening of the temporary station accommodation, we suddenly found ourselves in urgent need of an extra 1000 metres of a particular cable. Draka pulled out all of the stops and had the cable manufactured and delivered to site within 48 hours, which enabled us to complete the planned installation before the system came back on line." He concludes: "That was typical of the service we received from Draka throughout the contract." IFP

Sprinklers in Hospitals

Many will remember the outcry at the decision announced a year ago not to fit sprinklers in the new £300 million hospital being built at Larbert, between Glasgow and Edinburgh. Central Scotland Fire Service said that the brigade would prefer sprinklers were fitted over other fire prevention measures.

By Alan Brinson

European Fire Sprinkler Network

Gordon McQuade of the Fire Brigades Union was more direct, saying "What they are doing is the bare minimum". Ian Mullen, chairman of NHS Forth Valley, who was under pressure to defend the decision said, "It's ridiculous to suggest that we are in any way cutting corners and it's not about cost". He claimed that the trust had been advised there were more effective methods to tackle fires in hospitals and commented, "If you have patients for example in an intensive care unit linked up to highly sophisticated electronic machinery it may not be the most sensible thing to have those patients and that equipment deluged with water."

The comment from Ian Mullen is illuminating. I am sure he is not suggesting that patients in a room that is on fire should be left to burn. More likely, he thinks that all the sprinklers go off together, not just one or two over the fire. He probably also thinks that sprinkler systems are prone to false operations, spraying water over patients and equipment without a fire. In fact sprinklers are no more likely to leak than the hospital plumbing. But if you are reading this you probably know that. The challenge to the fire safety community and in particular the sprinkler industry is to communicate the truth about sprinklers to the healthcare industry, for doctors and healthcare managers have perhaps the strongest influence on decisions to install sprinklers in the facilities they run.

Since this very public row, facts have begun to emerge. There are thousands of hospitals around the world that are fitted with sprinklers, including some in this country and quite a few in Scotland! Sprinklers are fitted as standard in hospitals in North America, including in operating theatres, where to guard against the small risk of a slow leak from a pipe joint or from a sprinkler, the pipes and sprinklers run around the edge of the room. This summer I visited Northwestern Memorial Hospital in Chicago, which first opened in 1999. Every part of the building is fitted with sprinklers, including the new stem cell research laboratory, which has a pre-action system. There are even sprinklers below an overhead walkway that crosses a road, to protect it should a vehicle catch fire underneath.

In September I also visited University College Hospital in London, which has sprinklers in the

corridors and wards to compensate for a reduced number of compartments. Thus sprinklers enabled the hospital to go ahead with its preferred layout. The hospital first opened in 2005 and is about to open a new wing, which is again fully sprinklered. The experiences of University College Hospital, Northwestern Memorial Hospital and thousands of other sprinklered hospitals show that Ian Mullen's fears are not borne out in reality: nobody has been hurt by the sprinkler systems and it is extremely rare for them to go off by accident.

We do not have information in the UK but in the US the National fire Protection Association has collected information on fires in healthcare facilities. The most recent data I have seen is from 1994-98. On average there were 2,600 fires each year in American healthcare facilities, 69% of which were in buildings fitted with sprinklers. This proportion fitted with sprinklers has probably since increased. Fire deaths were 86% lower in healthcare facilities fitted with sprinklers and property fire losses were reduced by 72%.

Hospitals are not immune to fires. On 2 January this year fire destroyed five operating theatres and two wards in the Royal Marsden Hospital in central London, our premier cancer research hospital. In May the operating theatres were still closed. I have not heard if they have since opened. Four people were also injured in that fire. On 26 May 2007 fire destroyed eight operating theatres in the VU Medisch Centrum in Amsterdam. Fortunately nobody was hurt but the cost for the repairs alone was estimated at €50 million. No figure was put against the cost of the disruption to hospital services. I have not heard any cost estimations for the Royal Marsden fire but the damage alone will be a large figure. Perhaps the 'business interruption' cost in terms of lost hospital output will not be calculated but it is real and translates into an extra burden on the NHS and delayed treatments for patients.

Sadly there have also been deaths in hospital fires. From anecdotal reports I am aware of fatalities from fires in hospitals in Almelo, the Netherlands; Hamburg, Germany; Pfastatt, France and in a mental health ward of Broadgreen Hospital in Liverpool.

Fortunately government guidance is becoming more positive about sprinklers. While Approved Document B is the fire safety guidance used for the design of many buildings, instead it is *Firecode – fire safety in the NHS Health Technical Memorandum 05-02: Guidance in support of functional provisions for care premises* which is used to design hospitals in England and Wales. The latest

edition of this document was published in January 2007. Scotland has its own document, *NHS Scotland Firecode Scottish Health Technical Memorandum 82.* Regarding sprinklers HTM 05-02 says, "With the exception of buildings over 30m in height, the guidance in this document does not require the installation of sprinklers in patient care areas of healthcare buildings. However, the design team is expected to consider the advantages that might be gained by installing life-safety sprinklers throughout the building. Any decision should be considered as an integral part of the fire safety strategy and should clarify the decision to select low or ordinary hazard. However, sprinklers or automatic fire suppression should be installed in commercial enterprise areas in accordance with Health Technical Memorandum 05-03: Part D – 'Commercial enterprises on healthcare premises'."

In healthcare premises, particularly in patient access areas, the immediate and total evacuation of a compartment, or sub-compartment in the the event of a fire may not be possible or desirable.

It is to be hoped that the expectation to consider sprinklers will lead to them being installed more in the future in hospitals in England and Wales, if for no other reason than that designers will otherwise have to explain why they considered sprinklers but decided not to include them.

Scottish HTM 82 includes Supplement A: Automatic fire control systems and voice alarm systems. The section on Automatic Fire Control Systems begins, "In healthcare premises, particularly in patient access areas, the immediate and total evacuation of a compartment, or sub-compartment in the event of a fire may not be possible or desirable." It goes on, "In certain scenarios, due to the patient's medical condition and/or dependency on electrical/mechanical equipment, it may not be practical or advisable to move or disconnect the patient from such life support equipment. In this context the evacuation of patients from their position of care is effectively a 'last resort' and therefore available technologies should be used to minimise the probability of this occurrence."

"To both minimise the probability of occurrence of the requirement to evacuate patients and to maximise the time available prior to this eventuality an appropriate automatic fire control system should be installed throughout the building." Given that this document was published in April 2003 it is baffling that the hospital trust decided not to install sprinklers in the new Larbert hospital. It is to be hoped that in future anyone designing a new hospital in this country will read and follow the government guidance, give serious consideration to sprinklers and to the fire safety benefits and design freedoms they afford, and follow the example of the thousands of hospitals which are already fitted with sprinklers. IFP

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CPVC Fire Sprinkler Systems are joined using one step solvent cement, requiring neither cleaner nor primer. The pipes are easily cut and chamfered and their light weight allows a single installer to assemble the system and to work easily overhead.

By Sinikka Freidhof

Lubrizol Advanced Materials Europe (Blazemaster)

The following summarises the jointing techniques for CPVC pipe and fittings, giving an overview of those situations that require special attention.

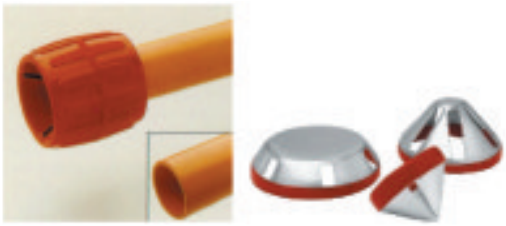
Note: This summary does not replace the manufacturer's installation guideline. Prior to any installation, installers should be trained by the manufacturer or the distributor of the respective CPVC fire sprinkler system!

Cutting of CPVC pipe

CPVC pipe can be easily cut with a ratchet cutter, a wheel-type plastic tubing cutter, a power saw or a fine toothed saw. Tools used to cut CPVC must be designed for plastic use and must be in good condition in accordance with the tool manufacturer's recommendations. It is necessary to cut the pipe square as this provides the surface of the pipe with maximum bonding area when it is bottoming out inside the fitting. If any indication of damage or cracking is evident at the pipe end, at least 5 cm beyond any visible crack needs to be cut off.

- **Note:** Special care needs to be exercised when using ratchet cutters as their blades dull quickly.
- Only use ratchet cutters that contain a sharp blade
- Ratchet cutters should only be used at temperatures of 10°C or warmer
- Only use well-maintained, good quality ratchet cutters capable or consistently cutting the pipe squarely.
- Details can be obtained through training and information from manufacturers and distributors.

Deburring of CPVC pipe



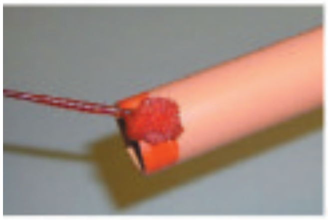
After the pipe has been cut, the pipe ends need to be chamfered. Burrs and filings can prevent proper bonding between pipe and fitting during assembly and must be removed from the outside and the inside of the pipe. A slight bevel (10 to 15°) shall be placed at the outside end of the pipe to ease entry of the pipe into the socket. The bevelled edge helps the solvent cement glide in between the pipe and the fitting while being inserted and thus minimises the risk of solvent cement being removed from the fitting inside during insertion.

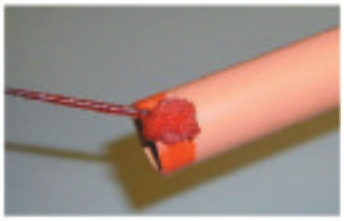
Fitting preparation

Prior to applying the solvent cement, a clean, dry rag shall be used to wipe loose dirt and moisture from the fitting socket and pipe end. Moisture can slow down the cure time and at this stage of assembly, contact with water can reduce the joint strength. First of all, the dry fit of the pipe and fitting should be checked. The pipe should enter the fitting easily ⅓ to ⅔ of the way into the socket. While testing the interference fit, the pipe should not bottom out in the socket as the fitting inside is tapered.

Solvent cement application

Once dust or particles are wiped and the pipe and fitting are clean the solvent cement shall be applied with an appropriate sized applicator. For a ¾" and 1" pipe, use a 12 mm dauber. For all larger pipe sizes use a larger dauber, which is generally part of the 1 litre size cement can. There are two different sized tins of CPVC solvent cement available, each tin including an appropriate sized dauber attached to the cover. Using the properly sized dauber will prevent too much solvent cement





from being applied to the joint. Excess cement puddles can lead to increased cure time or cause clogged waterways. On the other hand, too little solvent cement on the other hand could lead to leakage. Although jointing of CPVC pipes and fittings is fast and easy, installers shall obtain proper training and request a training certificate and card to show to the authorities or approval bodies upon request.

bottoms out at the fitting stop. The pipe needs to be rotated into the fitting while it is inserted and not after it has bottomed in the fitting. To ensure initial bonding, hold the pipe and fitting together for approximately 30 seconds. A bead of cement should be evident around the pipe and fitting juncture. If the bead is not continuous around the socket shoulder, it may indicate that insufficient cement was applied. If insufficient cement is

Not all plastics have the same fire resistant characteristics. Mixing different kinds of plastics (e.g. a PVC fitting meant originally intended for use in waste water or other CPVC products destined for industrial or plumbing applications) is inappropriate.

The solvent cement, which contains CPVC, has a shelf life of two years. The date of manufacture can be checked at the bottom of the can. A heavy, even coat of cement shall be vigorously applied to the outside pipe end and a medium coat of cement applied inside the fitting socket. Pipe sizes 1¼" (DN 32) and larger shall always receive a second cement application on the pipe end. Excess cement outside of the joint can be wiped off, the solvent cement inside the fitting remains for bonding. Only solvent cements that have been specifically formulated and listed for use with CPVC fire sprinkler systems and approved by the pipe and fitting manufacturers shall be used. The specific solvent cement that is approved for use with CPVC fire sprinkler systems can be obtained through the manufacturers and distributors selling BlazeMaster® CPVC products.

Assembly

After applying cement, the pipe needs to be inserted into the fitting socket immediately, while rotating the pipe one-quarter turn until the pipe

applied the fitting must be cut out and discarded. Proper training teaches the installer how to produce and recognise a good joint on the spot as well as understanding how much solvent cement is necessary for a proper joint.

Exercise special care when installing sprinkler heads! Sprinkler heads should only be installed after all the CPVC pipe and fittings, including the sprinkler head adapters, are solvent cemented to the piping and allowed to cure for a minimum of 30 minutes. Sprinkler head fittings should be visually inspected to insure that the waterway and threads are clear of any excess

Table 1. Minimum required cure times

SOLVENT CEMENT CURE TIMES (Maximum hydrostatic Pressure Test of 15 bar)		
	Ambient temperature during cure period	
Pipe size	16°C to 49°C	4°C to 15°C
¾" and 1"	1.5 hrs	4 hrs
1¼" and 1½"	3 hrs	32 hrs
2"	8 hrs	48 hrs
2½" and 3"	24 hrs	96 hrs

Table 2. Average consumption of solvent cement by an experienced fitter

Fitting Size	Number of Joints per litre	Pipe Length in meter per litre
¾″	285	1140
1″	190	760
1¼″	137	548
1½″	106	424
2″	74	296
2½″	53	212
3″	42	168

cement. Sprinklers shall not be installed in the fittings prior to the fittings being cemented in place as solvent cement could drip and plug the sprinkler head.

Set and cure times

Solvent cement set and cure times depend on the pipe size, temperature, relative humidity and tightness of fit. Curing time is faster for drier environments, smaller pipe sizes, higher temperatures and tighter fits. Cure times need to be increased when moisture is present such as during cut -ins to live sprinkler lines. A specific procedure for modifications or repairs to existing CPVC fire sprinkler lines has been developed. The assembly must be allowed to set, without any stress on the joint, for one to five minutes, depending on pipe size and temperature. Following the initial set period, the assembly can be handled carefully, avoiding significant stresses to the joint.

Table 1 indicates the minimum required cure times if pressure testing at 15 bar.

An installation starts with the larger diameters and then is finalised with the smaller diameters used for the branch lines.

Pressure testing

Once an installation is completed and cured per the recommended times, all installation pipe work shall be **hydrostatically** tested as stated in the manufacturer's installation guidelines. CPVC systems must never be pressure tested by air or compressed gas as air or gas is more compressible than water. A system failure when using compressed air or gas for system acceptance testing may result in property damage, serious injury or death.

Estimating solvent cement quantities

Installers often ask how much solvent cement is needed for a project. It is not possible to make an exact indication, but the average consumption of solvent cement by an experienced fitter is approximated (see table 2).

If you are not sure whether the CPVC product you intend to use is suitable for the installation, please check for the colour (it needs to be orange), the approval imprints on the pipes and fittings (look for LPCB, UL or FM), the brand name of the pipe and the company name of the manufacturer.

Recommendation

In addition to the need for proper training, it is also important to understand that **only appropriately CPVC products approved by LPCB, VdS, UL or FM for installation in fire sprinkler systems shall be used for the installation**!

Not all plastics have the same fire resistant characteristics. Mixing different kinds of plastics (e.g. a PVC fitting meant originally intended for use in waste water or other CPVC products destined for industrial or plumbing applications) is inappropriate.

Unapproved plastic products must never be used in a CPVC fire sprinkler system as the installation will not conform to the requirements. In addition, this may represent a dangerous source for a system failure in case of a fire. If you are not sure whether the CPVC product you intend to use is suitable for the installation, please check for the colour (it needs to be orange), the approval imprints on the pipes and fittings (look for LPCB, UL or FM), the brand name of the pipe and the company name of the manufacturer. IFP

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Art for art's sake – suppression for safety's sake

The latest crop of orders from Tyco shows that gaseous fire suppression systems are not just for protecting conventional IT and telecommunications facilities, as recent projects for Norway's National Library, its National Gallery, the Munch Museum, and Turkey's prime minister's archive building illustrate. John Allen, EMEA Marketing Director of Tyco Fire Suppression & Building Products explains.

John Allen, EMEA

Marketing Director, Tyco Fire Suppression & Building Products

In recent years, industry and commerce has focused a considerable amount of attention on business continuity and disaster recovery measures, so much so that fixed gaseous suppression is by far the most preferred option for protecting business critical assets. However, safeguarding equipment and facilities that keep the wheels of industry turning is not the only use to which these systems are ideally suited, and not every asset finds its way onto a company's balance sheet.

National assets come in many and varied forms. They may be important works of art or literature, or historic documents. Either way, their protection is vital as, in many cases, they are not merely difficult or costly to replace, they are truly irreplaceable. Often, what is at stake is a nation's heritage. But, just as in a commercial application, a particular fire safety challenge dictates the choice of suppressant, the special demands of each heritage site also have to be taken into account.

Norwegian heritage protection

Among the landmark projects that demonstrate this are three in Norway: the National Gallery; the National Library; and the Munch Museum. The National Gallery in Oslo was established in 2003 through a merger of the Norwegian Museum of Architecture, the Museum of Decorative Arts and Design, the Museum of Contemporary Art, the National Gallery, and the National Touring Exhibitions. Today, it comprises 4,500 paintings, 900 sculptures, 950 plaster casts, 17,300 drawings and 25,000 prints from as far back as the Middle Ages. The greatest attraction however, has been the early, major works by Edvard Munch, such as the world-renowned *The Scream*.

The National Library houses unique collections of manuscripts, books, music, radio and TV programmes, film and theatre posters, maps, pictures, photographs and newspapers, with the earliest documents dating back to the 13th century.

The Munch Museum is dedicated to the work and life of the Norwegian painter Edvard Munch and has a permanent collection of well over half of the artist's entire production of paintings and at least one copy of all his prints. This amounts to over 1,100 paintings, 15,500 prints, six sculptures, as well as 500 plates and 2,240 books.

So, by any definition, these three buildings house collections that are priceless; they are also constantly available to visitors. The key criteria for selecting the appropriate agent was, therefore, to adopt a system that had three essential characteristics. Firstly, the system obviously had to extinguish a fire in the shortest possible time; the chosen agent also had to do no damage whatsoever to the precious exhibits; and it had to be completely safe for discharge in occupied areas of each building.

Two other factors were also taken into account. There was a clear desire to choose a suppression solution that was sustainable and not likely to be called into question in a few years' time, and to ensure that the agent's environmental characteristics were of the highest internationally-accepted standard.

Although each of the three contracts was separately negotiated, the decision in each case was to opt for the SAPPHIRE® system that uses 3M™ Novec™ 1230 Fire Protection Fluid. The Munch Museum was the first installation to be completed and, at the time, was heralded as being one of the first large land-based orders for the then new fire suppression system. Interestingly, combined, the two more recent orders are nearly four times the size of the earlier Munch Museum project.

Unlike many other fluid fire extinguishing agents, SAPPHIRE can be used with absolute confidence to suppress fires involving document archives and fragile historic relics; artefacts that would otherwise be destroyed by water from traditional sprinkler systems. When discharged, the agent disperses as a gas and, most significantly, SAPPHIRE leaves no residue to damage Norway's priceless historic manuscripts and works of art that, at the very least, would otherwise inevitably have to be subjected to years of highly skilled and expensive restoration work.

SAPPHIRE systems have a negligible impact on the environment and an insignificant global warming potential that is lower than any of the halocarbon agents that are acceptable for use in occupied spaces. The suppressant is stored in containers as a low vapour pressure fluid that, when discharged, converts into a colourless and odourless gas. Typical total flooding applications use a low concentration of the fluid that is well below the agent's saturation or condensation level.

SAPPHIRE installations have an installed footprint similar to that of other chemically- based clean agent systems and, most significantly, the Novec 1230 fluid has the lowest design concentration and the highest safety margin of any viable Halon 1301 chemical alternative. While certain Hydrofluorocarbons and inert gases are used at design concentrations that are below the NOAEL or No Observed Adverse Effect Level, with safety margins from seven percent, no other Halon alternative comes anywhere close to the SAPPHIRE system's safety margin.

Turkish archives

So, one of the key characteristics of SAPPHIRE is that it is entirely safe for it to be discharged where people are working or visiting. However, unlike exhibits in a gallery, not all national treasures are on public view.

Indeed, at first glance, there may not appear to be much common ground in the terms "government archives" and "national treasures". However, to future generations keen to learn how their country's decisions were reached, and political historians anxious to interpret a government's policy making, they fully justify being given the same protection as a work of art. One such recent example is the fire protection system installed to safeguard the Turkish Prime Minister's archive in Ankara where, in a two-phase project, several hundred HYGOOD® CO_2 (Carbon Dioxide) high pressure containers were installed.

The requirements for the suppression system for the Turkish archive mirrored many of those specified for the Norwegian projects, with one notable exception. While fast and effective suppression, sustainability, the certainty of no damage being caused to the protected items, and the utilisation of "clean" technology were essential characteristics, the important difference was that the Turkish archives are not normally occupied.

Hence the decision to use CO_2, which comes into its own when seeking to provide total flooding protection for unoccupied spaces. This is because the discharge of CO_2 in fire extinguishing concentrations is lethal to room occupants. Because of this, it was essential, as part of the Turkish archive project, to take steps to ensure that every CO_2 flooded area could be adequately ventilated after discharge to prevent accidental exposure of personnel to dangerous levels when investigating the cause of the discharge.

HYGOOD CO_2 is an engineered system that uses individual premium-build steel storage cylinders that can be manifold-linked together to enable rapid, simultaneous discharge. The colourless, odourless and non-corrosive gas is stored under pressure and is piped to the protected enclosure, where it is released via a network of piping and strategically located discharge nozzles. The container valves can be opened automatically, and two or more hazard areas can be protected with a single group of containers by means of directional or selector valves. IFP


Fire Resistant Glass Solutions

The Application of Performance-based Fire Safety Design in Shanghai

In many countries around the world, building designs are shifting from prescriptive to performance-based for technical, economic, and social reasons. This paper presents the advancement and development of the application for performance-based fire safety design in Shanghai, China. These include a comprehensive analysis of advantages and disadvantages both of the prescriptive and performance-based design[1] leading to the principles of application scope and alternative technological solutions which are suited to performance-based design. It also indicates the relationships which should be receive great attention to during the use of performance-based fire safety design. The Shanghai Pudong International Airport No.2 Terminal, as a case of performance-based fire safety design is introduced in this paper.

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Performance-based fire safety design is for special building with comprehensive consideration of its function, architecture conformation, fire load, and conditions, etc. The design is provided on the bases of theories and methods of fire safety engineering and computer simulation and mathematics computation for realizing complete integrity of fire safety and investment benefit. Performance-based fire safety design is one of the most advanced technologies in the field of fire protection, and one of the most active researches in the foreland as well.

1 The characteristics of performance-based fire safety design

1.1 The advantages of performance-based fire safety design

1.1.1 Goals. In traditional fire protection design, the designers only need to comply with the

design of fire protection zone, the measures must be taken to control fire within fire compartment in the building.

1.1.3 Integration. Performance-based fire safety approach emphasizes a comprehensive fire protection strategy in which all fire protection systems are integrated, rather than designed in isolation. Not only the passive, but also the active fire protection measures of the building are considered during the design. Such a comprehensive engineering approach often provides greater cost-effectiveness in construction and satisfies the client. It also helps us to achieve the fire safety target by integrating the advantages and functions of fire alarm system, sprinkler system and smoke ventilation system.

1.1.4 Flexibility. Performance-based design is unlike prescriptive design. It makes the design more free and flexible by exerting the designers' subjective creativity. It gives support for innovation on materials and form of construction resulting in development and popularization of new product and new technology. It also adapts the demand of high-tech and aesthetics in modern buildings and offers chance for an insurance company to take part in fire protection.

1.1.5 Rationality. The study of performance-based design is to perfect the traditional design and to make the design more scientific and rational. In other words, the performance-based design is not only to improve the safety standards or reduce the fire protection cost directly, but also to optimize the fire protection subsystems better under the precondition of meeting the requirements of fire safety level.

principles of the fire codes. But in the performance-based fire safety design, the designer must pay much attention to the life and fire safety goals, functional and performance objectives. After identifying the fire safety goals, the designers should integrate the fire precautions by choosing freely any possible way to meet any desired criteria basing on different spaces, function demands and other related conditions of the building. Generally speaking, the primary goals of fire protection design are to provide an acceptable level of life and fire safety including safety to people, protection of property, providing for operation continuity and protection of environment from the influence of fire. It is considered that developing performance criteria and defining the boundary condition and numerical value to which the expected performance of the trial designs can be compared to meet desired the goals is the core of the performance-based design.

1.1.2 Pertinence. Performance-based safety approach provides a design according to actual circumstances of special building, but is not standard for any building. For example, in the aspect of life safety, refuge area and evacuation path must be designed in order to safeguard people from heat radiation, smoke and other poisonous gases. In the aspect of prevention of fire spread, neighborhood buildings and combustible materials must be protected from being ignited. For the

1.2 The disadvantages of performance-based fire safety design

1.2.1 Localization. On one side, performance-based design aims at special construction projects and solves main problems such as fire protection compartment, safety evacuation, smoke control, fire facilities and structure protection. It is not suitable for all buildings and all problems. On the other side, the building designed on performance-based approach should have to be designed again when it changes the function. That is the localization of the performance-based fire design.

1.2.2 Complexity. Performance-based design needs great quantity of experimental data and professional design and evaluation tools for support. While at present the basic experimental data is scattered and not abundant in China. There's no application software for large-scaled project nowadays and most of software used for performance-based design have not yet been experienced in many practical projects and fire experiments. They are still faulty and may bring influence to the optimization of the design and the veracity in calculation.

1.2.3 Difficulty. Performance-based design is a new technology which covers fields of fire science, fire dynamics, mathematics statistics, computer technology and behavior psychology during fire. It is much more difficult than prescriptive design for demanding flexibility. It needs for designers to have good theoretical knowledge, rich practices, professional training and noble morality.

1.2.4 Time consumption. Performance-based design is much more complex and difficult. Performance based design process requires more engineering time for analysis, calculation, and design documentation, and it also needs the clients, designers and related administration to discuss again and again, so it often takes much more time than the prescriptive design for the same building. It may say a performance based design is a great achievement of brooms of clients, designers and official reviewers, and also it is a result of repeated negotiation and compromise between them.

2 The application scope and design parameters of performance-based fire safety design

2.1 Application Scope

Performance-based fire safety design has many advantages, but that doesn't mean it is suitable to all projects. It is considered that the Performance-based design will be applied to solve unusual and unique problems in complex buildings only where fire requirements are not fully addressed by Chinese national codes or where strict compliance with Chinese national codes compromises the function of the building. Generally speaking it is suitable to the projects as follows:

1 Large-scaled railway stations, airport terminals, exhibition halls, gymnasiums and theatres.

2 High-ceiling or large-volume spaces, such as shopping malls, supermarket, warehouses and logistic centers.

3 Public spaces with tall and large-scaled atrium.

4 Large clean rooms for medicine and electron, etc.

5 Other important buildings with potential for extremely high property or life loss.

Performance-based design should not be applied to the following buildings in principle or where the national codes fully address fire requirements.

1 Habitable buildings such as residences, apartments and dormitories.

2 Common locations such as office rooms, hotel rooms, sickrooms and classrooms in public buildings.

3 Small workshop and warehouses handling with grade 1 and 2 combustible and explosive materials or goods.

4 Public entertainment places such as singing rooms, dancing halls, video play rooms, etc.

5 Buildings for old-aged citizens and places for children such as nursing homes, kindergarten or game rooms.

2.2 Design parameters

Performance-based design should be based on the following parameters except common design contents:

1 Characteristic parameters. It includes the characters of building, scale of fire, personnel characters, heat release speed, flame dimension, smoke quantity, temperature and density of smoke and gas, concentration of toxic gas.

2 Circumstance parameters. It includes evacuation preplan, influence of circumstance, fire resistance of structural component, and fire fighting capability of fire station, etc.

3 Time parameters. It includes time of flash over, fire spread in an enclosure space, initiation of fire alarm system, smoke ventilation system, sprinkler system, and other automatic fire suppression system, response of fire department, time for occupants evacuation.

4 Probability parameters. It includes data of fire statistic, dependability of fire prevention and fire suppression system.

5 Safety goals. It includes not only to safeguard people's life, to protect property and structure, but also to prevent the fire spread in order to reduce the fire losses, to provide for continuity of operation, and to limit the environmental impact of fire.

3 Key points should be paid much attention to in the application of performance-based design

3.1 The relationship between performance-based design and prescriptive design

For many buildings that are straightforward in size, shape, and use, prescriptive codes provide the designer with sufficient guidance. The prescriptive codes, in which goals and objectives are absent, set forth minimum requirements for protection and are generic by occupancy. Examples include spacing requirements for fire compartment, detectors or sprinklers, specified fire resistance, or maximum travel distances. So comparatively the prescriptive codes are convenient for designers and reviewers. Prescriptive design is the embodiment of human beings fighting against fire, and plays an important role in the aspect of fire safety design and fire loss prevention. But it also has some disadvantages, which limit the innovation of new material, new structure, new technology and new methods. As a result it influences the art

creation of architect, even the shape and use of building as well.

Performance-based design has features of clear target, flexibility and integration and provides a new way to solve the new problems. Both the Performance-based and prescriptive design have the same safety target but the different way and measure to solve problems. Performance-based design is applied to some particular buildings with complex functions, super space and super height. But prescriptive design is suitable and easy to most general buildings. In this way, the two kinds of design can't instead of each other. They can exist together in a quite long time as performance-based design is a good complementarity to prescriptive design. On the other hand, the study and practice in performance-based design in China is at the primary stage. The code and guide of performance-based design still haven't been set up. So it's helpful for us to grasp code of prescriptive design while promoting application of performance-based design approach.

Prescriptive design is the embodiment of human beings fighting against fire, and plays an important role in the aspect of fire safety design and fire loss prevention.

3.2 The relationship between performance-based design and fire safety evaluation

Performance-based approach brings forward the project design through engineering analyzing way and focusing on the problems brought out by the maladjustment between present prescriptive codes and project practice or the incomplete and indefinite prescription. The fire safety evaluation of the total project design is the core of performance-based design. The evaluation is not only for validating whether the precautions can achieve the adaptable fire safety level of the building, but also for amending and perfecting the project design. So any item of performance-based design should be evaluated. The total fire safety level should be adaptable to related code and criterion in China. So the evaluation should base on related code and criterion, fire statistic data and simulated experiment result inside or outside China.

3.3 The relationship between popularization and steadily development

Though performance-based approach provides a useful approach to solve new problems in fire safety design and is accepted by more and more people, it is still at the primary stage and not perfect in some aspects. So it can't be considered as the only choice to solve all problems in fire safety design.

Today, fire safety design is based on the actual fire codes in China. Performance-based design is only used for buildings not be definite in present codes or some particular ones. Actually, only 1%-5% buildings are designed by performance-based approach in advanced countries, e.g. about 1% buildings in USA, 1%-5% in New Zealand and Australia, 1.5% in Germany. In China, less than 0.5% buildings are designed with performance-based approach. So it is considered that Performance-based design and evaluation should be popularized actively on one hand and should be applied steadily on the other hand.

4 The application of performance-based approach in Shanghai

4.1 The challenges for fire protection in Shanghai

Shanghai covers an area of 6430 km^2 with a population of more than 20 million. Since China's embarkation on the cause of reform and open to the world, especially since 1990s, Shanghai has been developing rapidly into a city full of vigour and vitality. Shanghai will host the World Exposition in 2010. By the year 2020, Shanghai will have been turned into a modern world city characterized by a prosperous economy, high levels of social civilization and a beautiful environment. It will have established itself as an international economic, financial, trade and shipping centre. With the development and adjustment of city function and conformation, Shanghai has changed greatly with the 5 following features:

1 Many high-rise buildings. There are about 13,000 high-rise buildings more than 24m height and about 420 super-high-rise buildings more than 100m height in Shanghai nowadays. For example, Jinmao Building with 420.5m height is the highest one in China at present. International Financial Center, which is under construction now and will open in July of this year, will be one of the highest buildings throughout the world with 492 meters height up to the roof. These buildings used performance-based design which was done in conjunction with RJA, a global fire protections engineering firm.

2 Many underground spaces. There are about 15 million m^2 underground spaces nowadays, which will be developed more reasonable and more scalable. For example, large-sized underground suit market will be built near the Bunds of Huangpu

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River and 500KV main transformer for EXPO 2010 will be set in 45m depth underground. Also there are 7 tunnels through Huangpu River in use and 6 tunnels are under built. In the project of "South Tunnel & North Bridge" over Changjiang River, the tunnel is 8 km long with 15m in diameter divided into 2 levels, the upper level is for roadway and the lower for railway, beside which there is a 220KV municipal electric cable chamber. It is considered to be the first multiple function tunnel throughout the world.

3 Many chemical plants. There are 5 main large chemical bases in Shanghai, they are Gaoqiao Chemical Base, Wujing Chemical Base, Taopu Chemical Base, Jinshan Chemical Complex and Shanghai Chemical Industry Park. Especially with the development of Shanghai Chemical Industry Park, top chemical companies in the world have been settled in Shanghai one after another. 1200,000 tons of ethylene plant and 10 million tons of oil refinery plant will be established in Shanghai.

4 Many big projects. Large micro-electron clean workshop, large logistics centers and large shopping malls emerge in endlessly. Especially important projects such as Hongqiao Transport Hinge Center with a 1,300,000m^2 syntheses building, large-sized China Exhibition Hall, Theme Exhibition Hall, Convention Center, and Art Center are under construction for EXPO 2010.

5 Many railway lines. There have been 5 lines put into use with the total length of 145km at present. 6 lines and 178 railway stations are under construction. By the end of 2010 the railway lines will reach to 400km. Besides metro lines and light track lines there is a maglev line in Shanghai.

With the all above, cosmopolitan fire problems focus in Shanghai. If the requirement of structure protection, fire compartment, safety evacuation, smoke control and fire suppression in many projects are executed according to the prescriptive code, the function of the building and the realization of clients' idea will be influenced and impossible. That brings great challenges to fire safety design and fire protection review.

4.2 The application of performance-based fire safety design

For the purpose of ensuring the safety development, application of performance-based fire safety design is actively promoted for some special large projects in Shanghai.

4.2.1 Performance-based design and evaluation of Shanghai Pudong International Airport No.2 Terminal

Shanghai Pudong International Airport No.2 Terminal (hereafter is called T2) is a enormous modern building group covering 485,500m^2 including a terminal building, an air gallery and a passenger gallery, with a capacity of 40,000,000 person-time/year. The buildings have a big-spanned shape in mixing framework system with armored concrete and steel structure. The terminal building is 40m high and 416m long, the passenger gallery is 32.3m high and 1,414m long, and the air gallery is 42.3m high and 289.5m long.

The terminal building, air gallery and passenger gallery all have large space. It is very difficult to divide the whole space for fire compartment according to the fire code, resulting in the fire compartment too large and the evacuation distance too long. Besides there have many technical problems in steel structure protection, smoke control, fire detection and alarm, and automatic fire suppression.

Focusing on the characteristics and the function, the T2 was designed with fire safety engineering approach under the authorized computer modeling and mathematics computation. The hot smoke flowing of T2 in case of fire was simulated with the FDS software and the passenger evacuation also simulated with STEPS software. The computing software was used to account heat radiation, mist temperature, alarm and sprinkler response time in T2, and after which the fire risks and harms were analyzed and demonstrated in numerical value. Basing on these, the strategy of fire compartment, smoke control, safety evacuation, steel structure protection and fire suppression system were put forward for T2.

1 The concept of fire prevention cabin. The "fire prevention cabin" is indicated for high-fire-loaded zones such as office room and supermarket in the check-in hall. The "cabin" design will enhance the fire protection facilities in the areas with high potential of fire. It could ensure the limitation of fire disaster with integration of local fire compartment, fire detect and alarm system, smoke extraction system and sprinkler system. Such a design will guarantee the continuity of passengers moving freely and the operation of the airport without the physical compartment for large space in case of fire.

2 The concept of fuel island. The "fuel island" is indicated for area with combustible material. The "island" design will analyze and ensure the fire safety space between fixed or moving combustible material in large space of the terminal. It demands the area of every booth less than $9m^2$ and the safety space must be roomed between booths and shops. It should also keep a reasonable space between chair areas in the waiting hall to prevent the spread of the fire.

3 The concept of fire isolation belt. The "isolation belt" means for safety distance in belt shape between two separated parts. There will design an isolation belt of 12m width between check-in hall and united-check hall, and an isolation belt of 15m width between international waiting gallery and united-check hall. There should not be any combustible material in the isolation belt. That is considered a reasonable approach to solve the problem in fire compartment in the terminal.

4 The concept of cold smoke extraction. The "cold smoke extraction" means that air conditioning system is used to exhaust the smoke after the fire is suppressed. So there will be no mechanical smoke exhaust system in some public areas with light fire load in large space of the terminal. In order to ensure the effect of the smoke exhaust, it was required to design and install automatic smoke exhaust windows on the top of the terminal after the evaluation of performance-based design.

5 The concept of subsection evacuation. "subsection evacuation" means for passenger evacuation from section and section but not from the whole terminal in case of fire. Fire may happen in some local small area within the large space of the terminal. So it's not necessary to require evacuation of passengers from the whole building. Only when the fire is extremely uncontrollable, persons in the whole terminal should be required to evacuate. Basing on performance-based analysis, it's required less than 60m for the evacuation distance in the terminal.

6 The concept of local protection. In the aspect of steel structure fire protection, basing on performance-based evaluation, only the steel components near the 18.40m level at interlayer in the waiting gallery should be protected, and the other part will be no necessary to have fire protection. That is the concept of local fire protection.

Modern buildings with different functions and shapes have been emerging in Shanghai day after day. It provides wide stage for engineers and designers in application of performance-based fire safety design and evaluation, and that will be encouraged and supported further more. IFP

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Shen Youdi, born in Shanghai in 1954, has worked in fire service for 35 years. The current post is Chief Engineer of Shanghai Fire Department, Deputy Director of the Board of Shanghai Fire Protection Association, Master of Laws. He has organized and instituted a series of administrative prescriptions and technical standards in the field of fire protection. He is active in promotion and development of performance-based fire safety approaches, and in the reformation of administrative review and approval system of fire service. He has translated and published the two books, *Fire Problems in High-rise Buildings* and *Fire Hydraulics*, and has compiled *Fire Protection Directory in Chinese, Japanese and English*.

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Understanding the "normal" capability of Aspirating Smoke Detection

High-sensitivity Aspirating Smoke Detectors (ASD) have been in use for many years, but the basis of their approval has historically been the fire tests used to test normal sensitivity Optical and Ionisation Point-type Smoke Detectors. As many users of Aspirating Smoke Detectors will testify, ASD are generally used for Early Warning and the detection of incipient fires which means that they are "normally" configured and commissioned to be significantly more sensitive than "normal". Is that a problem? Does EN 54-20 help?

Starting with a review of the basics of ASD technology, this article explains the rationale behind and some of the results from testing ASD systems to EN 54-20. Most importantly, it presents three observations of installed systems to reveal that, in terms of EN 54-20, most ASD systems are currently installed to either Class B (enhanced sensitivity) or Class A (high sensitivity). It concludes with a recommendation that consultants and designers should be careful to clearly specify the sensitivity Class they require of any ASD system they propose.

By Peter Massingberd-Mundy

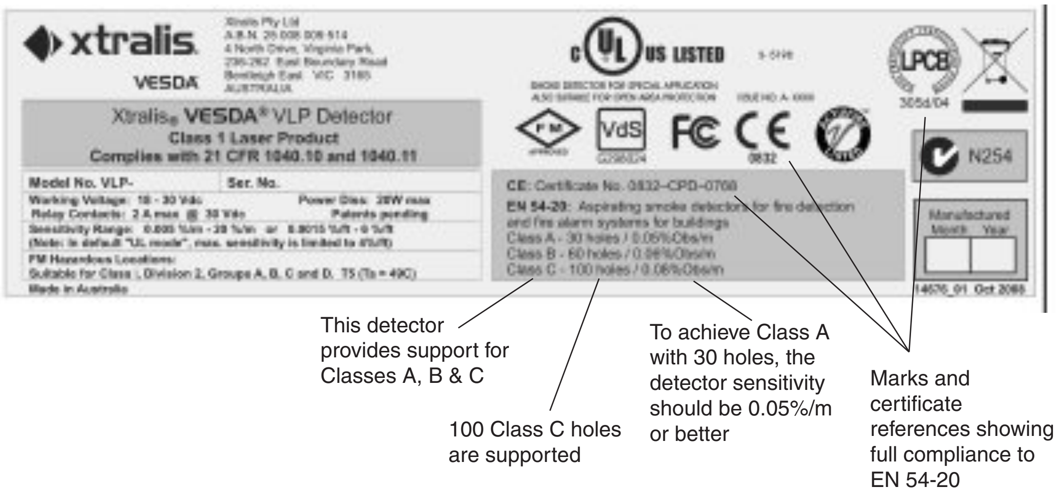
Technology and Expert Practices Manager, Xtralis – manufacturers of VESDA

Regular readers will already be aware that EN 54-20 was published in June 2006 and introduced three classes of sensitivity. This is only useful if those people responsible for specifying and installing the technology actually use the Classes when defining and selecting ASD for the protection of particular risks. If the Class definitions are not used in the field then there is a risk that they will be omitted from future versions of the standard. So – use it or lose it!

ASD – the cumulative advantage

ASD systems are by their nature a little more complex than point-type detectors because they are sampling from many different points in space. To keep the analysis simple, consider that an ASD

Figure 1 – Product label showing Class and capability to EN 54-20



system draws samples from several holes (let's assume 20). If smoke enters only one hole then it is mixed with clean samples from the other (19) holes before it reaches the detector. As such the detector in a multi hole ASD *must* be many times more sensitive than a standard point detector (*at least* 20 times for our example) in order to detect the standard test fires (TF2-TF5). The "at least" is a reflection that the sampling holes in a practical system do not all draw exactly the same amount of flow. Some (typically nearer the detector) draw more flow and are consequently more sensitive. Those drawing less flow (further from the detector) are effectively exposed to a greater dilution ratio. Fortunately, more and more ASD manufacturers are now providing pipe modelling programmes which calculate the sensitivity of each individual hole – such as ASPIRE2 used for VESDA and ICAM ASD systems.

While this "dilution effect" does not need to be considered for point-type detectors, it has a distinct advantage in practise because smoke often spreads through a space. When smoke enters two or more sampling holes the dilution from the remaining holes is lessened. In effect the whole system becomes increasingly sensitive the more the smoke spreads and enters more holes. The fortunate consequence of this is that ASD systems provide an excellent measure of the size of the original 'packet' of smoke released into the protected space – whether released from a fast hot fire in the form of a classic plume or released slowly from an incipient file and diluted throughout the space by air currents and time. In the latter case ASD is preferred over point-type smoke detectors because measurement of the obscuration in the immediate environment of the point is of little value – you need to know how much smoke has been released and diluted in the larger space. It is for this reason that ASD systems perform so well in the windy datacentre and the large open spaces of building atria, large manufacturing & warehouse spaces and public buildings such as airports and railway stations – they maintain a better perspective on the size of the source.

To illustrate, if smoke with a 10% obscuration/m is sufficient to cause an alarm when entering 1 hole on a 20 hole ASD system then smoke with 5% obscuration/m entering 2 holes will also cause an alarm. Equally, smoke with a concentration of 2.5% obscuration/m entering 4 holes would result in an alarm and ultimately, smoke with a concentration of only 0.5% obscuration/m entering all 20 holes results in an alarm. This cumulative effect is particularly relevant when protecting large open spaces.

When smoke enters two or more sampling holes the dilution from the remaining holes is lessened. In effect the whole system becomes increasingly sensitive the more the smoke spreads and enters more holes.

EN 54-20 – a safe approach

EN54-20 takes no account of this cumulative effect and simply requires that each and every hole on any Class C system can independently detect the same four test fires that a point detector must detect. This is logical because, in a fast growth fire, smoke may only reach one hole in which case the cumulative effect is of no benefit. The result of a Class C approval to EN 54-20 is confidence that the particular system is at least as reactive to fire as any EN 54-7 point detector.

However, as already observed, ASD systems are often specified for their high sensitivity and early warning capabilities because they offer significantly more than equivalent fire detection to a point

detector with the added benefit of cumulative sampling. In fact, they offer the ability to reliably signal early warnings when there are extremely low concentrations of smoke present. This being proven by successful detection of the smaller test fires for Class A and Class B systems.

Nuisance alarms are a misconception

Ignorance of the nature of ASD's cumulative effect underlies many misconceptions about false or unwanted alarms from such high sensitivity systems. Observing that smoke of only 0.5% obscuration/m is not enough to be certain there is a fire, they conclude that nuisance alarms from background levels will be the consequence. In fact, while 0.5% obscuration/m *at a single point* may not be sufficient to be confident of a fire, when spread through a space it indicates that there is a significant threat which is well above normal background levels. More importantly, our field experience with extremely stable, fixed calibration VESDA technology indicates that background levels are typically less than 0.02% obscuration/m and rarely exceed 0.05% obscuration/m (other than in particularly challenging environments) – so there is typically a safety factor of >10 before nuisance alarms become an issue.

The 10% obscuration/m figure quoted above is rooted in the EN 54-20 approvals of the VESDA system and relate to Class C. To be specific, all Xtralis VESDA detectors are approved to EN 54-20 Class C as long as the sensitivity of every hole is better than 10% obscuration/m in the installed system. As such, an Xtralis VESDA VLP can support (and has been tested with) up to 100 holes at detector sensitivity of 0.08 %/m. For Classes A & B the hole sensitivity must be better than 1.5% obscuration/m and 4.5% obscuration/m respectively. As such they can support (and have been tested with) 30 holes at 0.05% obscuration/m

Our field experience with extremely stable, fixed calibration VESDA technology indicates that background levels are typically less than 0.02% obscuration/m and rarely exceed 0.05% obscuration/m (other than in particularly challenging environments) – so there is typically a safety factor of >10 before nuisance alarms become an issue.

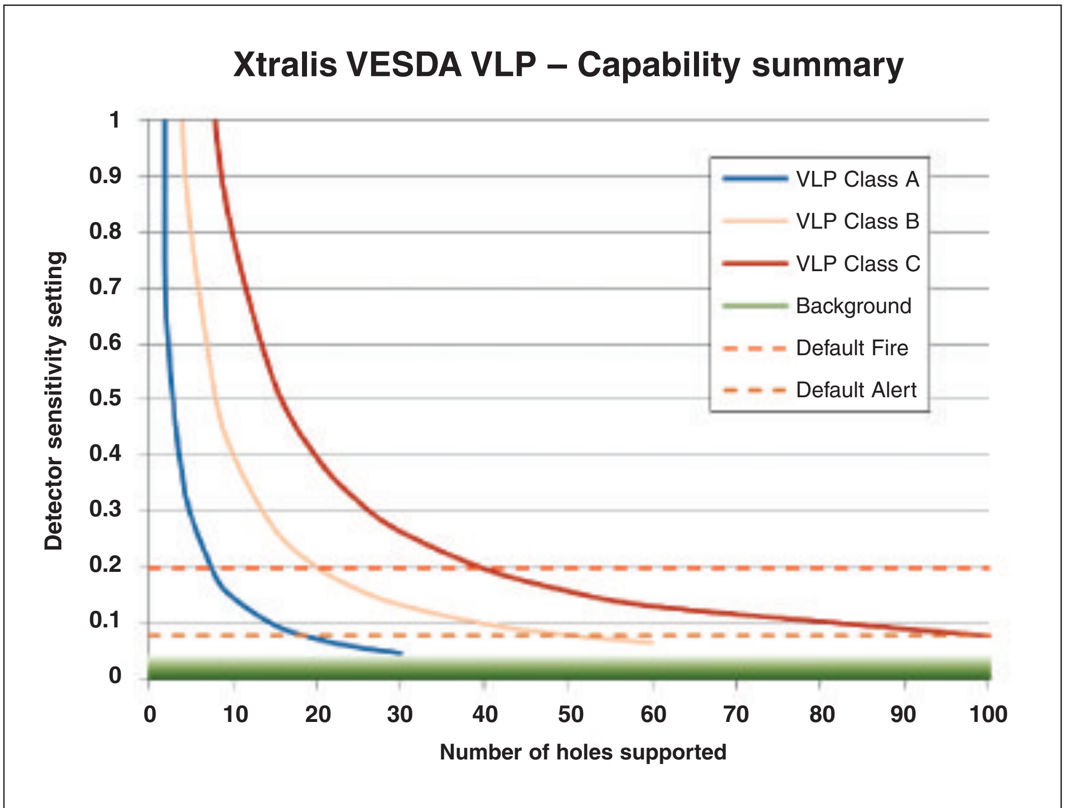


Figure 2 – Summary of Xtralis VESDA VLP capability

and 60 holes at 0.06% obscuration/m respectively. This information is published in the datasheet and appears on the product label (see Figure 1). Of course where fewer holes are drilled on a system the alarm thresholds can be correspondingly relaxed as summarised graphically in Figure 2.

Figure 2 reflects that a Class C system is with 100 holes is achieved with a detector sensitivity of 0.08% obscuration/m (as per the label) but a Class C system with 40 holes is achieved with a sensitivity of 0.2% obscuration/m. This is a simple general calculation. For a particular installation an ASPIRE2 calculation is recommended.

Most importantly, the graph makes it clear that with typical background readings of <0.02% obscuration/m, nuisance free Class A and Class B systems are realisable with a satisfactory safety margin against nuisance alarms.

Field experience

When an understanding of the EN54-20 capability of the VESDA VLP is combined with several field observations it is clear that the majority of ASD systems installed in the field are currently Class B or better.

The first observation is grounded on the fact that the default thresholds on a VESDA are Fire = 0.2% obscuration/m (Alert = 0.08% obscuration/m and Action = 0.14% obscuration/m) and that many systems are operated successfully with these default thresholds in place. This is logical since the fire threshold is 10x higher than any typical background readings (the Alert threshold is 4x higher) so nuisance alarms are rare. Moreover, if the number of sampling holes is 20 or less (which is generally the case), the sensitivity of each individual sampling hole is better than 4.5% obscuration/m so the system is operating with Class B sensitivity.

An alternative way of setting the alarm thresholds on a VESDA system is to use a commissioning tool called AutoLearn. This monitors the background environment for a number of days (typically 14) then sets ALERT threshold with a safety factor of about 3 and the other thresholds correspondingly above. Our observations indicate that AutoLearn typically results in Fire thresholds of <0.1% obscuration/m and often significantly less in clean office environments. This means (with reference to Figure 1) that they are operating at Class B or better as long as they are supporting fewer than 40 holes.

A third observation that supports this conclusion comes from the fact that there is a tendency to directly compare ASD sensitivity values with the nominal values quoted for point detectors – typically stated as having a sensitivity of 3-5% obscuration/m. In fact, basic point detectors need to be set to this level of sensitivity to effectively detect the flaming fires (TF4 and TF5). In contrast, Xtralis VESDA detectors, as verified by testing to EN 54-20, only require a single hole with a sensitivity of better than 10% obscuration/m to successfully detect all 4 class C test fires (including TF4 and TF5). However, the practical consequence of this misplaced comparison is that many Xtralis VESDA systems (which are not left to operate at default thresholds or commissioned using AutoLearn) are configured to have individual hole sensitivities of better than 5% obscuration/m which is approaching the detector’s Class B limit of 4.5% obscuration/m.

Other sources

Xtralis are proud to be the first ASD company to achieve full approval to EN 54-20. To support designers of their systems Xtralis has invested considerable effort in its design tools and support documentation. For example ASPIRE2 has been modified to enable design to the Standard and Xtralis has taken a leadership role in the marking of all its products to explain the Class approvals. Though it is inevitable that other manufacturers will release compliant product prior to the standard becoming mandatory from July 2009 across most of Europe, it is important they make it clear how the Class of any particular ASD installation is to be determined. All ASD manufacturers should be encouraged to clearly publish their detector capabilities in terms of the number of holes they can support at a given sensitivity for a given Class.

Conclusion

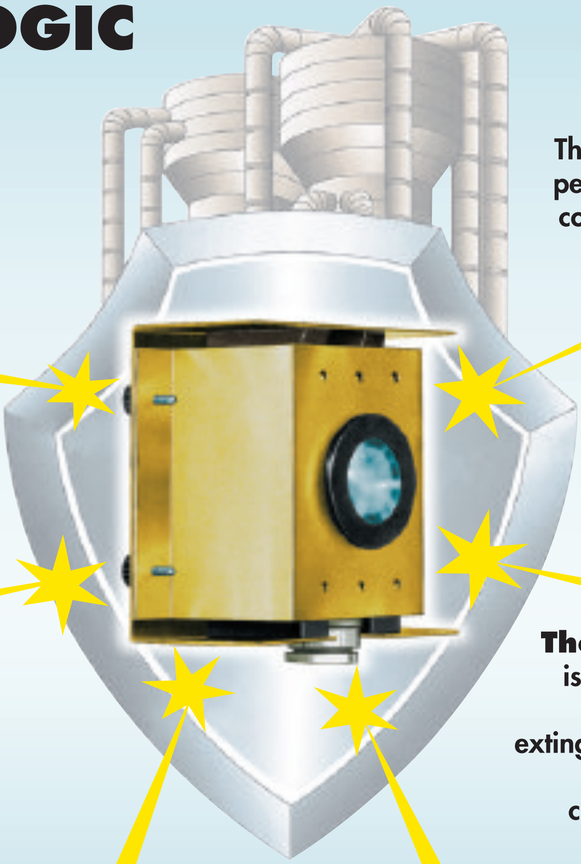
For the specifier and designer of ASD systems it is imperative to specify the sensitivity Class required for any particular ASD project. If it is left unspecified then there is a risk that the performance achieved will be significantly less than that expected. This is particular true given that the majority of ASD installations currently installed achieve a Class B capability or better – as supported by the evidence presented in this article.

Moreover, it is important to verify that the product selected is suitable for the application. Not only must it have an approval for the sensitivity Class required but it must also support the number of holes envisaged for the project and provide sufficient information to ensure that the alarm thresholds are correctly set at commissioning to achieve the Class required. IFP

When an understanding of the EN54-20 capability of the VESDA VLP is combined with several field observations it is clear that the majority of ASD systems installed in the field are currently Class B or better.

Further information is available at:
www.en54-20.org and in the FIA Code of Practise for Aspirating Smoke Detectors

CONTROL LOGIC Spark detector



Sparks fly at high speed.

They travel at a hundred kilometres per hour along the ducts of the dust collection system and reach the silo in less than three seconds

designed for dust collection systems to protect storage silos from the risk of fire.

The CONTROL LOGIC SPARK DETECTOR is faster than the sparks themselves. It detects them with its highly sensitive infrared sensor, intercepts and extinguishes them in a flash. It needs no periodic inspection.

The CONTROL LOGIC system is designed for "total supervision". It verifies that sparks have been extinguished, gives prompt warning of any malfunction and, if needed, cuts off the duct and stops the fan.

ISO 9001

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E-mail: controllogic@controllogic.it - Web: www.controllogic.it

CONTROL LOGIC s.r.l.

BETTER *TO KNOW* IT BEFORE

Eye is faster than nose.

In the event of live fire
the IR FLAME DETECTOR
responds immediately

CONTROL LOGIC IR FLAME DETECTOR

the fastest and most effective fire alarm device for industrial applications

IR FLAME DETECTOR RIV-601/FA EXPLOSIONPROOF ENCLOSURE

For industrial applications indoors or outdoors where is a risk of explosion and where the explosionproof protection is required. One detector can monitor a vast area and responds immediately to the fire, yet of small size.

Also for
RS485 two-wire serial line

IR FLAME DETECTOR RIV-601/F WATERTIGHT IP 65 ENCLOSURE

For industrial applications indoors or outdoors where fire can spread out rapidly due to the presence of highly inflammable materials, and where vast premises need an optical detector with a great sensitivity and large field of view.

ISO 9001

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CONTROL LOGIC s.r.l.

100% Redundant Fire Systems for Industrial Applications

The new *Ax-Series* of intelligent fire detection products

ADVANCED ELECTRONICS, one of the largest independent global fire detection manufacturers in the industry, has launched a new redundancy controller for its *Ax-Series* of UL approved fire alarm panels. The controller has been designed for heavy industry where redundant and resilient fire detection is critical for plant operation. All of the field wiring is connected to the redundancy controller which in turn routes it to one of two *Ax-Series* fire panels. Should a system fault occur in the panel the field wiring is automatically routed to the second standby panel. The controller and fire panels are installed in an industrial rack enclosure.

The *Ax-Series* consists of high-end control panels and a range of fire detectors and field devices. The range complements the established EN54 approved *Mx-4000* series of intelligent fire panels, which have been successfully sold in the UK and Europe for a number of years.

The *Ax-Series* is UL 864 approved and has a number of unique and innovative features that will appeal to fire system consultants, designers and installers. At the heart of the new range are the analogue addressable fire control panels, which are available in both 2 and 4 loop configurations and can be networked together using *Ad-NeT+*, the company's well-established fault-tolerant network system. This allows the *Ax-Series* to provide

simple cost effective solutions from the very smallest through to very large multi-panel network systems requiring thousands of devices. The panels include extensive network cause-and-effect event programming capabilities which are fully programmable from the built-in keypad or via *PC-NeT*, a suite of Windows™ based software tools.

Ax-Series panels also incorporate the Advanced Dynamix-Zoning function. Larger systems typically require large number of zones in order to comply with fire regulations and to give clear unambiguous indication to the user. Historically, the number of zonal based I/O and reporting requirements for these installations often exceeded the capability and/or capacity of the individual control panels used to make up the multi-panel networked system. Dynamix-Zoning effectively overcomes these restrictions, allowing buildings with many hundreds of zones to be readily supported with standard panels and equipment.

The *Ax-Series* range of fire detectors and field devices offers the system designer extensive choice. Fire sensors include optical and ionisation smoke, heat, multi-sensor and beam detectors. All of the smoke detectors include drift compensation and selectable sensitivity modes controlled from the fire panel. Field devices include pull stations and an extensive array of I/O modules.

For further information contact:
Advanced Electronics Ltd
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Fax: +44 (0) 1670 707 222
Email: marketing@advel.co.uk or visit www.advel.co.uk

LPCB Approval for C-TEC's XFP Fire Panels

C-TECs entire range of XFP networkable analogue addressable fire alarm panels have attained third-party LPCB approval.

Recognised by governments and regulatory authorities across the world, the approval demonstrates that all six of C-TEC's XFP panels have been extensively tested for functionality and performance, comply with EN54 Parts 2 and 4 and meet the overall standards of the Loss Prevention Certification Board, the leading international certification body in the fields of security and fire protection.

Says Charlotte Manley, C-TECs European Sales Manager: C-TEC invests millions of pounds in quality control and approvals and this accreditation underlines our dedication to manufacturing products of the very highest standards. The LPCB stamp is the ultimate seal of approval and I have no doubt that our investment will pay off. We have already received advance orders and our overseas customers are particularly delighted by the news.

Offering high performance at a very competitive price, the XFP range is ideal for office blocks, shopping complexes and big industrial sites as well as smaller, standalone applications.

Available as a cost-effective single loop 16 zone panel in a plastic enclosure or a robust 1 or 2 loop 32 zone metal panel, XFP panels offer an array of user and installer-friendly features including full compatibility with Hochikis ESP and Apollos XP95, Discovery and Xplorer protocols, two independently programmable conventional sounder circuits and the ability to interconnect up to eight XFP main panels onto a two wire RS485 network. The XFP is also fully compatible with C-TECs new Hush Button fire alarm solution for Houses of Multiple Occupation.

For more information, please contact the company's sales desk on +44 (0) 1942 322744

C-TEC'S new LPCB Approved Automatic Extinguisher Panel

C-TEC's new LPCB approved three-zone automatic extinguisher panel has been specifically designed for areas housing expensive, dangerous or irreplaceable items such as computer servers, chemicals or antiques.

With the growing emphasis on safe-guarding not only people but property and societys increasing reliance on computerised systems, the market for such panels is booming. Fully compliant with EN 12094 part 1, the panel has been manufactured to the highest standards and epitomises quality, durability and reliability.

With three programmable detection circuits and three programmable sounder circuits, the panel has been extensively tested in a quality-controlled environment and is currently operating in a number of trial sites. A 128 x 64 pixel graphic display with two-colour backlight provides a user interface for presentation of information and interrogation of data held by the EP203. The panel also possesses adjustable extinguishant release, delay and flood times and an array of programmable relay outputs with volt free changeover contacts, a time stamped log and a facility to delay the alarm sounders.

An alarm counter also records the number of times the panel has been in an alarm state.

Comments C-TECs MD, Andrew Foster, C-TECs new state-of-the-art Research and Development facility and recruitment of additional specialist engineering staff has made the development of this new auto-extinguisher panel possible. This product has been designed to meet demand from our customers for a top quality extinguisher panel and we confidently expect the EP203 to exceed all expectations.

Up to eight Remote Status Units with their own graphic displays and manual release functions can be connected to the panel via a simple two-wire RS485 bus to indicate the status of the system in buildings with multiple entrances. Low-cost single-gang Economy Status Units are also available as are Abort and Hold buttons. An optional relay expansion unit, fitted in the main panel housing, can also be purchased for system expansion.

For more information, please contact: Alex Saint, Marketing Executive, at alex.saint@c-tec.co.uk

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C-TEC'S Hush Button now compatible with Hochiki and Apollo Protocols

C-TEC's Hush Button fire alarm solution is now compatible with both Hochiki's ESP and Apollo's XP95/Discovery protocols.

Designed to give fire alarm installers a unique opportunity to enter the lucrative and rapidly expanding HMO marketplace, C-TEC's revolutionary new product costs just £70 trade.

According to BS 5839 part 6 (the code of practice for fire alarm systems in dwellings) around 80% of all UK fire deaths and injuries occur in homes. Nowhere is the risk greater than in Houses of Multiple Occupation (HMOs) where a fire in one 'dwelling' can quickly spread to another.

Providing reliable and fully monitored fire detection, alarm and silencing facilities inside each individual apartment, C-TEC's Hush Button solution puts the resident firmly in control of their own fire detection system. Basically the Hush Button functions as a miniature fire alarm – the resident can silence a false alarm themselves (for example should they set the alarm off accidentally by burning a meal) thus preventing false alarms, full-scale evacuations and the likelihood of a true alarm condition being ignored.

Says C-TEC's MD, Andrew Foster: 'Now C-TEC's Hush Button is compatible with Apollo XP95 and Hochiki ESP – the fire alarm industry's leading analogue open protocols – I am certain it will become a great seller. Indeed I have no doubt that Hush Buttons will be fitted as standard in many Houses of Multiple Occupation in the not too distant future such are the benefits they offer the occupant".

For more information, please contact C-TEC's sales desk on 01942 322744.

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FIKE introduces Fire Alarm Event Management Systems

FIKE ALARM SYSTEMS is proud to announce the release of its newest products, the Precise Vision™ and Precise Touch™ computer-based event management systems.

Created to help control and monitor facilities during emergency situations, Precise Vision allows facility managers and/or key personnel the ability to respond to alarm and trouble situations with just a few easy clicks – gaining access to building floor plans, emergency contacts, and security plans. In addition, Precise Vision has the capability to inform appropriate personnel via email about alarm situations.

Precise Touch is an intuitive computer graphics package designed for use in public locations so that responders can quickly locate an alarm situation, view floor plans, identify potential hazards and find emergency exit routes. This intelligent device is also powered with knowledge to locate where a fire started, how it is progressing and what potential hazards may exist, so personnel can quickly locate the nearest exit route.

"These event management packages interface with Fike fire alarm technology, giving users detailed, visual information on exactly what is happening within their facility, so the safest and most efficient action can be taken for the situation," said Kevin Montgomery, Market Manager. "Both of these products are easy to operate and provide intuitive information for facility managers and/or personnel to respond quickly."

Precise Vision and Precise Touch were specially designed to work with the Fike CyberCat® fire alarm control panels and can be customized and adapted to meet changing needs of a facility.

Fike is a globally recognized supplier of products and services that protect people and critical assets from dangers such as fire, explosion, and over-pressurization. With over 60 years experience manufacturing safety solutions, Fike offers a complete line of proven, reliable products to customers around the world.

For more information, please contact:
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Email: kevin.montgomery@fike.com
Website: www.fike.com

Gent by Honeywell

NANO

A new fire alarm panel designed by the engineers who will be installing it has been launched by GENT BY HONEYWELL.

The Nano control panel has been developed in close partnership with Gent's network of approved System Integrators (SIs), who have had significant input into its design and practical usage.

The panel is designed for small building applications, capable of powering a loop with up to 127 devices. It has a simple cause and effect which can be configured by a simple PC commissioning tool.

Developed with ease of use as a high priority, Nano delivers an experience that makes the fire alarm system easy to use and safe to operate. It is also design-led to ensure the panel looks good in any type of building.

Mark Ayton, managing director of Gent by Honeywell, said: "Nano is a breakthrough product in terms of design and functionality, giving scope for more sophisticated fire technology to be used in smaller buildings.

"We included our network of SIs in the process from the start, so they could choose the style and function which they will find best to work with when installing it.

"They were presented with various design options, with all feedback incorporated into the product development process. We pride ourselves on good working relationships with SIs but the Nano plans involved more in-depth interaction with them about a new product than ever before."

The Nano panel operates the latest Vigilon loop devices from Gent by Honeywell, including the S-Quad and S-Cubed ranges, allowing a small system to benefit from Gent's advanced fire detection technology.

Nano is the latest innovation from Gent, which has a proud history of pioneering developments in fire technology including the first loop powered sounders and interfaces, later followed by devices with combined sensor, sounder, speech and strobe functions.

VIGILON

Vigilon is a feature-packed analogue addressable system which is Gent by Honeywell's most popular fire alarm panel. It offers the latest in system flexibility for medium to large sized buildings.

One panel is able to support a system which covers up to 10,000 sq m, with a maximum 1,200 devices across six loops.

The sophisticated system also incorporates a host of features designed to make it simple to install, configure and use.

Vigilon is compatible with Gent's multifunctional S-Quad devices, which includes sensor, sounder, speech and strobe functions in one device. Voice messaging capability through the sounder functionality of S-Quad ensures quick and safe evacuation in the event of a fire.

The combination of S-Quad sensors with the Vigilon panel provides quick and intelligible decision making. Vigilon's processor is able to locate and analyse what is happening in any zone, with the alarm prompt decided by the panel based on information received from the

sensors. The S-Quad's dual angle optical sensor recognises a clear distinction between smoke and steam.

Vigilon's backlit 8-line by 40 character display presents clear indication of fire or fault locations. Separate zonal indication with 32 fire LEDs gives an 'at a glance' indication without the need for manual intervention by fire fighters. Fire plans can be tailored to precisely meet project requirements.

Vigilon also provides a historic log of the system's management information. Should a system fault occur, a detailed explanation is shown and the user can navigate through the faults history at any time.

The panel is available with a 24 or 72 hour standby function, with advanced options allowing multi-domain networks of up to 260 panels to retain control on large or complex sites. Also, new buildings or extensions are easily accommodated onto the existing system.

VIGILON COMPACT

Vigilon Compact is an analogue addressable one or two loop panel offering the unique system functionality of Vigilon with the very best in control panel aesthetics for small to medium sized buildings.

For larger scale projects it can be networked with up to 31 other Compact panels and is also compatible to be linked into Vigilon systems.

The introduction of innovative design features into this panel means that the wall space needed to mount the panel is 60 per cent smaller than a standard Vigilon installation.

Stainless steel door options are available to provide a discreet and luxurious feel in up-

market office environments.

The LCD display allows clear indication of fire or fault locations, while site specific plans can be programmed to meet the evacuation needs of the building.

Vigilon Compact analogue addressable panels fully comply with EN54: Parts 2 & 4 and can be specified with one or two

detection loops, each capable of accommodating up to 200 Vigilon devices including repeat panels, interfaces, manual call points and Gent's innovative S-Quad device.

S-Quad is a combined multi-sensor range with speech, sounder and strobe in one intelligent unit. The four separate sensing elements in the S-Quad, including CO, can be set with individual sensitivity levels and sensor 'states' can be programmed for different time periods to suit all applications and environments.

The combined power of S-Quad and the Vigilon Compact panel provides quick, intelligent decision making. The S-Quad dual angle optical sensor recognises a clear distinction between smoke and steam.

Fully compatible with Gent's S-Cubed alarm devices (offering sound, speech or strobe effects in combination), Vigilon Compact also offers the familiar advantages of combined function devices and loop powered beam detection with integral short circuit isolators fitted into every single loop device.

Separate zonal indication, visible at access level 1, comprises 32 fire LEDs which gives an 'at a glance' overview without the need for manual intervention by fire fighters.

For additional information, please visit www.honeywell.com

Honeywell Building Solutions: XLS80e Control Panel

The XLS80e control panel from HONEYWELL BUILDING SOLUTIONS, is available in 2 through to 8 loop versions, and is one of a few in the market place that will comply with the standards and yet provide control of over 512 devices. The Enhanced Loop Interface Board (ELIB) enables multi processor control to provide up to 8 loops of detection and loop powered sounders from one controller. The key benefit of this system is the functionality that can be provided when connected to Enterprise Building Integrator, EBI™. EBI™ provides a seamless graphical representation of alarms and processes to:

- Hasten the identification of a genuine fire alarm condition
- Improve the efficiency of evacuation procedures

- Provide seamless smart integration with Building systems:
  - Fire
  - HVAC
  - Intruder

  - CCTV
  - Access Control
  - Energy management
- Total control and responsibility for integrated solution, be they 3rd party or in-house
- Enable Honeywell Building Solutions to provide a total solution tailored to the needs of the customer

Advanced design and manufacturing techniques together with Honeywell's 50 plus years of experience at the forefront of the fire industry, ensure that the XLS80e sets new standards in areas of functionality, flexibility, user friendliness and reliability. The XLS80e is the first choice when it comes to smart building integration. Connectivity with Enterprise Building Integrator (EBI™) affords total control over your building services: Lifesafety, CCTV, Access Control, HVAC, Asset Location, Intruder and Energy Management . The EBI™ platform is the point at which the different functions come together into a common operator interface, pulling all data from the component applications together into one graphical user interface on a pc screen.

- Seamless integration into EBI™
- Enhanced Loop Boards provide connection of more than 512 devices per control panel
- Supports Honeywell's advanced detection:
  - FILTREX – harsh environment detector
  - Loop powered aspirating module
  - Intrinsically safe equipment
  - Laser sensor point detection
  - Loop powered sounder beacons
- 24 and 72 hour standby
- Interfacing to Public Address and Voice Alarm systems (PAVA)
- Peer to peer or master slave networking

Contact:
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Arlington Business park
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United Kingdom RG12 1EB
Tel: +44 (0)870 600 1659
Website:
www.honeywellbuildingsolutions.co.uk

Syncro Matrix™ is a revolution in fire alarm Mimic display technology

KENTEC's Syncro Matrix™ uses flexible, fibre optic light guides to illuminate areas on a fire alarm mimic display floor plan, laid over a high-resolution grid and it can be connected to any panel in Kentec's Syncro and Syncro AS fire alarm panel range. Syncro Matrix™ is also uniquely flexible and future-proofed as it completely dispenses with wiring, enabling indicators to be moved, removed or added on site.

When linked to the fire control panel, a Mimic Panel provides a graphical representation of the site or building layout to give users, at a glance, the location of the origin of a potential fire incident. The Matrix Mimic system uses bright, flexible fibre optic light guides, carrying LED-originated light to a high resolution grid, to illuminate zonal areas on a floor or site plan. This unique, rapidly configurable system dispenses completely with wiring and enables indicators to be moved, removed or added on site without the need for any wiring.

British Standard BS5839: Part 1:2002 recognises the benefits of such a graphical representation and recommends that a Zonal Plan is placed adjacent to the fire alarm panel.

Syncro Matrix™ can be supplied with or without LEDs and controls. Optional LEDs indicate Power on, Fire, Fault and Disablement and optional controls are for Alarm silence, Buzzer silence, Lamp test and Reset.

Housed in attractive, slim-line enclosures to match Kentec's Syncro and Syncro AS fire alarm panels and incorporating high quality, full colour or monochrome floor plans, Syncro Matrix™ provides a clear, geographical indication of fire alarm activation enabling speedy identification of the source of an alarm in a form that can be easily maintained and modified to reflect extensions or changes to building or site layout and usage.

Up to 500 indicators can be supplied on the Matrix Mimic. These default to zonal fire indications but are fully programmable and can be controlled by complex cause and effect relationships set by the fire control panel configuration software.

All indicators can be configured easily via Kentec's powerful and intuitive Loop Explorer configuration programme.

There are several enclosure size options with standard enclosures capable of housing 24, 56 or 88 LEDs. Bespoke housings for up to 500 LEDs to suit more complex requirements can be easily accommodated. The Matrix is ideal for environments where the building layout may evolve over a period of time.

Matrix Mimic panels are controlled by data transmitted from Kentec Syncro analogue addressable fire control panels over a two wire RS485 data bus. Unlike many conventionally wired mimic panels, which require a wire for each indicator, this method minimises the wiring required on site between the fire panel and the Mimic panel.

Because the indicators on Matrix Mimic panels are not wired but fed via electrically benign fibre optic cable, the electromagnetic compatibility characteristics are consistent and do not vary from one unit to another, so the units can be confidently certified as compliant with EMC requirements.

For more information contact Kentec on +44 (0)1322 222121 email robine@kentec.co.uk or visit www.kentec.co.uk

More loop options from Kentec as standard

In direct response to increasing customer demand, KENTEC's **Syncro 6 and 8 loop analogue-addressable panels** are now available as standard items, which will mean faster delivery times compared to made-to-order products.

Available in three analogue detector protocols, Apollo, Argus Vega and Hochiki, and with 96 zone indicators as standard, these Kentec Syncro panels can be purchased either with or without in-built printers. Supplied with two ENS400, 4 amp PSUs and with network cards fitted as standard, they are available in surface mounting versions only and without an enable keyswitch.

Kentec's pedigree for modularity means that Syncro Response, Focus and Focus+ repeaters, the modem as well as Guide and Guide Repeater, can all be seamlessly integrated to these Syncro panels, with the capability for networking to other panels in the Syncro family. The internal Syncro bus also allows the local interconnection of the ancillary Input/Output cards – relay, additional sounder and conventional zone modules, as well as the Syncro View Repeater.

THE SYNCRO FAMILY

Syncro Response is a full function repeater panel used to complement the Syncro control panel range. Using the most advanced microprocessor technology to provide a system of highest integrity, Syncro Response can be configured to suit all types of system, to provide selectable event reporting and controls from each networked panel. A large area graphic display ensures that information is presented in plain language with detailed extra help available by pressing a 'help' button. Syncro networks support three of the most widely used, leading fire data communication protocols.

Focus and Focus+ Network LCD Control Panel Repeaters. These simple and attractive repeater panels can be connected to any point on a Syncro network to provide additional display points as needed. Using the same large format graphics display as the main control panel ensures clear and concise indication is given at all times. These units are ideal for additional building entrances, security desks or nurses' stations, and provide an economical alternative to a Syncro Response full function repeater panel. The repeater also acts as a network booster and can be used to extend cable runs beyond the specified lengths as required.

Syncro GUIDE Graphical User Interface. Syncro fire control panels can send data to, and be controlled by, the Guide system providing a single point of co-ordination for all alarms. The powerful 32 bit programme features a standard Windows look and feel and runs under Windows 2000 or XP. The system presentation is highly configurable so that the end user can be presented with maps, text, photographs, audio or a combination of all as required. User profiles allow the system manager to control the facilities available to each individual system user. A comprehensive history logging and reporting system allows analysis of events and trends to be identified to reduce unwanted alarms. Easy to programme and simple to use, Guide provides a cost effective solution for fire alarm management at many levels, with Repeater provision for extended networking.

For more information contact Kentec on +44 (0)1322 222121 email sales@kentec.co.uk or visit www.kentec.co.uk

Sirius II from Kidde Fire Protection

The KIDDE "Sirius II" range of conventional fire detection and alarm panels has been designed with simplicity of operation and attractive appearance in mind. Available in 2, 4 or 8 zone versions, Sirius II 200, 4000 and 8000 are LPCB approved to EN54 Parts 2 & 4, including battery monitoring and detector removal.

Sirius II is compatible with Apollo, Hochiki and Nittan conventional detector ranges, making it ideal for retrofit installations as well as small industrial units, schools, shop units, private clinics and nursing homes, hotels, factories or residential premises.

All types of warning devices are supported; electronic sounders, bells and xenon strobes.

Integral zone detector removal is incorporated, with short and open circuit monitoring and no Active End of Line Device required.

Other features include:

- Real time clock/alarm counter
- Programmable zone co-incidence and sounder functions
- One man walk test
- LCD display for indication & programming menu
- Each zone supports up to 32 detectors and unlimited number of call points
- 2 x alarm circuits as standard rated 1 A @ 28 VDC
- Fire & Fault relay contacts
- Monitored Fire Output with disable function rated 0.5 A @28 VDC
- 2.5A Switch Mode Power Supply incorporating intelligent battery monitoring
- Zone disable function
- Class change input
- Company logo window
- Zone indication window

Sirius II supports an RS485 repeater network, with the possibility of up to 7 passive and 7 active standard 8-zone repeater panels.

Option cards available, all in 8-way format are Relay Output, Sounder Output and Input/Output.

For more information logon to www.kfp.co.uk

Sita 200 Plus

The SITA 200 plus single loop analogue addressable system allows up to 200 detectors and sounders on one loop – a specification currently unmatched in the marketplace.

The Sita 200 plus system is a single loop 'intelligent' analogue addressable system designed to satisfy the requirements of small to medium size fire systems, Sita is capable of supporting up-to 200 Multipoint combined detector/ sounders on its single loop, a specification unmatched in the Fire industry.

The CIE offers a comprehensive cause-and-effect feature enabling programing of events such as phased evacuation and alarm confirmation drastically reducing the problem of false alarms. A wide range of interfacing inputs and outputs allowing a large range of additional auxiliary functions are available at the panel, I/O is also available at each Multipoint device. The control panel has been designed to high specification and quality standards and fully complies with the new EN54 -2 and EN54 – 4 standards and EU directives. Sita is approved to the above standards by LPCB (Loss Prevention Certification Board)

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Twinflex 2-Wire Fire Alarm System

Incorporating the Multipoint detector with built-in sounder means the whole system can be installed using only one pair of wires.

Twinflex 2-Wire Fire Alarm System Using the Multipoint detector as part of the Twinflex 2-wire fire alarm system means that **when a detector is wired in, a sounder is too –** with no extra wiring required. This greatly reduces the number of points that need to be installed and the time it takes to install them.

As the Multipoint offers 7 different modes of detection, the installation is made even simpler as this one device suits all applications. Whatever type of detection is required, for any part of the installation, it can be selected by the flick of a switch at the time of commissioning. Any one of the 3 different smoke modes, 2 fixed temperature heat modes, a rate of rise mode and a combination smoke or heat mode can be selected.

As the Multipoint detector is available with or without a full specification 92dBA sounder (for only a marginal cost difference) no extra devices need to be purchased when audible warning is required (meets audibility levels recommended in BS5839 Part 1: 2002). Twinflex callpoints can be run on the same pair of wires as detectors. Further cost savings can be utilised by using the new combined callpoint/sounder. Both detectors and callpoints have a selectable EOL module so any device can be set as the end of line monitor. The panel can also differentiate between callpoint or detector alarms.

If extra sound is required, or for areas that do not require detection, then the Hatari Sounder can be used on the same two wires, offering sound output of 100dBA. It also has a built-in EOL monitoring switch.

The panel can accommodate 32 devices per zone, has separate fault monitoring displays for each zone, and a one man walk test facility. Zones are configured without the need to use resistors or capacitors on unused zones.

All Twinflex Systems have the 'Checkpoint' alarm confirmation feature drastically reducing false alarms.

Repeater panels are also available for the Twinflex system, which use key switch access and have the facilities silence, sound alarms and reset.

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Duonet

The DUONET system is a 1-2 loop intelligent analogue addressable, networkable, fire alarm system capable of supporting up-to 200 Multipoint combined detector/sounders per loop and a network of up-to 32 control panels.

The Duonet panel offers a full network capacity of up to 250 panels, each panel having 1 or 2 loops capable of supporting up-to 200 Multipoint combined detector/sounders on each loop. The panel supports two plug-in loop cards, giving choice for the size of system requirements. Although powerful software has been utilised, operation of the control panel remains user friendly with intuitive functions. Programming and commissioning of the Duonet system is carried out using the Duonet OSP software package, and as well as soft addressing the additional feature of 'safe initialisation' allows devices to be added or removed from the network easily

As well as offering one of the most technically advanced systems on the market Duonet also offers the specifier a piece of equipment that is appealing to the eye. A renowned design company was commissioned to produce a control panel that reflects the 'state of the art' technology it encases. The standard black hi-gloss finish panel for maximum visual impact. Many other finishes are available including brushed aluminium, walnut and marble if a different 'look' is required to make the Duonet panel a showcase product in its technical capabilities and also its appearance.

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F Gases are you up to speed yet?

By Rob Thilthorpe

Those involved in the gaseous extinguishing systems business should already be aware of EC regulation EC 842/2006. It was published in 2006 and came into force in July 2007 in Europe, becoming UK law in February 2008 when statutory instrument 41 was published. Over the last few years various aspects of the legislation have come into force and by 2010 all requirements will have entered into UK law, with all the resulting penalties (fines, prison) for non-compliance.

So you are all working in a manner that means you fully comply aren't you?

I can hear the cogs whirring right now: "F Gases", "EC 842/2006?" "Penalties" WHAT!!!!

However, as in "The Hitchhikers Guide to the Galaxy", this article does contain big red letters reading:

"Don't Panic!"

The Fire Industry Association (FIA), in conjunction with the Department of Environment and Rural Affairs (DEFRA), has been working to ensure that the UK industry has a smooth transition to compliance. In this article I will explain what the regulations are, what the main requirements are and how you can comply.

Firstly what is an F Gas? The title of the regulations goes some way to explaining this: "EC Regulation 842/2006 on certain fluorinated greenhouse gases" ie they are fluorinated gases and in this case it refers to hydrofluorocarbons (HFCs) and perfluorocarbons [PFCs]. For fire fighting it really means HFC's.

The F Gas regulations are part of the environmental protection regulations; many will remember the Ozone regulations (EC2037/2002) which lead to the demise of halon fire protection systems. We could debate whether that was a good or bad decision but it is too late – halon is gone! Some of

the agents that were developed to replace halon, whilst not ozone depleting, do have a global warming potential and are covered by these new regulations.

They cover all systems that use these gases – not just fire protection – but refrigeration and air conditioning systems, so yes the aircon in your car is covered. However, for this article we will concentrate on fire protection.

The fire protection gases covered are:

F Gas	Trade Names	Chemical Formula
HFC-23	FE-13	CHF_3
HFC-125	FE-25, ECARO, NAF-125	C_2HF_5
HFC-227ea	FM-200, FE-227, NAF-227	C_3HF_7
HFC-236fa	FE-36	$C_3H_2F_6$

we still have to prevent leakage, with the regulations stating that using all measures which are technically feasible and do not entail disproportionate cost, operators must: (a) prevent leakage of F gas fire extinguishants and (b) as soon as possible repair any detected leakage (article 3.1). Furthermore, it states that the operator must ensure that FP systems containing 3 kg or more of F gas are checked for leakage by certified personnel on a regular basis (Article 3.2). Certified personnel must comply with the requirements of Article 5: more on this later. These requirements came into force from July 2007.

What do the regulations require? The table below summarises the requirements and I will go into detail on each in the subsequent paragraphs.

Leak Checks	Regular leak checks for systems containing 3 kg or more of F gases.
Labelling	Products placed on the market must be properly labelled.
Recovery	Appropriate F gas recovery during servicing and maintenance and at end of life.
Records	Good records kept for each system containing 3 kg or more of F gases.
Training	Use of personnel with appropriate qualifications.

So, who is responsible? Well, most of the obligations in the regulations are placed on the operator of the fire protection systems and who is the operator? This was an area of great debate during the drafting of the regulations but the operator is defined as:

> *"the natural or legal person exercising actual power over the technical functioning of the equipment and systems covered by this Regulation; a Member State may, in defined, specific situations, designate the owner as being responsible for the operator's obligations."*

You may say I only install and maintain the system so I am not responsible. Sorry but no. Installation and maintenance contractors and fire protection equipment suppliers also have certain obligations, along with producers, exporters and importers.

What are the obligations?

The main aim of the regulations is to reduce the emissions of the gases to atmosphere. During the discussions on the drafting of the regulations we (the fire trade) put the case that fire systems were virtually none emissive and by working to the appropriate standards (ISO 14520) the chances of accidental emissions were also very low. However, Yes, you should be working to them now!

The regulations set out the frequencies of testing: these are given in the table below.

One of the great successes during the discussion on the regulations was that we provided sufficient arguments for the European Regulators to agree that the requirements of ISO 14520 met the leakage requirements. So as long as you work to ISO 14520 you comply with the regulations.

Another important requirement is that for large systems, i.e. over 300kg, automatic leak detection should be fitted as from 1 July 2007. Any system with over 300kg installed before this date will have to have automatic leak detection fitted by 4 July 2010.

Labelling is also a key requirement of the regulations; after all, it is important to identify what is in the cylinders. The labelling requirements are quite straight forward and came into force in April of this year. Any new fire protection systems and fire extinguishers placed on the market must be fitted with a label clearly stating that the equipment contains F gases, along with information on the type and quantity of F gas used.

In addition, labelling records must be kept: this came into force in July 2007 and the regulations require that records must be kept by operators on

System (charge) size (kg)	Frequency	Frequency with leak detection system installed
3 kg to 30 kg	Annual	Annual
30 kg to 300 kg	6-monthly	Annual
Greater than 300 kg	Quarterly	6-monthly

each system with 3 kg or more of F gas. The records must include:

- The quantity and type of F gas installed in each system
- Any quantities of F gas added
- The quantity of F gas recovered during servicing, maintenance and final disposal
- The identity of the company or technician who performed the servicing or maintenance, as well as the dates and results of leak checks and leakage detection system checks

The regulations also state that the records shall be made available on request to the competent authority and to the Commission.

container is undertaken by qualified personnel and that those removing it from site provide written evidence of its return to a specialist filling/reclamation facility.

Producers, importers and exporters are not exempt: as of 1 March this year and then annually afterwards, if you produce, import or export over 1 tonne of F Gas you have to provide the EC and UK regulator (BERR) information via a set of forms which are available from BERR. This only applies to imports and exports from non EU countries.

You may have noticed in some of the requirements reference to certified personnel. This is key

Any new fire protection systems and fire extinguishers placed on the market must be fitted with a label clearly stating that the equipment contains F gases, along with information on the type and quantity of F gas used.

As already stated, the regulations are there to prevent emissions to atmosphere so they also have requirements on recovery. If F gas needs to be removed from a system (e.g. during system decommissioning at the end of life) it must be properly recovered by appropriately qualified personnel. After recovery the F gas can be reused or sent for reclamation or destruction. The system operator is responsible for putting in place arrangements for proper recovery.

As those involved with gaseous fire protection systems area aware, the extinguishant is never added or removed at an installation site, only at a specialist filling facility. Therefore it is up to the operator to ensure that the disconnection of the

to the regulations and, in short, only trained and certified personnel are allowed to handle equipment containing F Gases. This covers leak checking, gas recovery, system installation or maintenance. The main requirements are covered in EC 842/2006 but specific, more detailed requirements, were published in a further regulation EC 304/2008. These more detailed requirements will take time for industry to meet and, in recognising this, the UK regulators are accepting existing "in house" qualifications for an interim period up to July 2010 . This means that if you have been trained by the OEM of the system to their training requirements, you are deemed to be qualified.

EC Regulation 842/2006	The F Gas Regulation
Commission Regulation 304/2008	Establishing minimum requirements and the conditions for mutual recognition for the certification of companies and personnel.
Commission Regulation 1497/2007	Establishing standard leakage checking requirements.
Commission Regulation 1494/2007	Establishing the form of labels and additional labelling requirements for products and equipment.
Commission Regulation 1493/2007	Establishing the format for reporting for importers and exporters of certain fluorinated greenhouse gases.
The Fluorinated Greenhouse Gases Regulations 2008 (Statutory Instrument No. 41)	This GB Regulation prescribes offences and penalties applicable to infringements of the EC F gas Regulation and lays out the current qualifications and certification requirements. It came into effect on 15th February 2008.
4th July 2007	**Leak testing** for F gas systems containing 3 kg or more. Leakage detection systems installed for applications containing 300 kg or more of F gases. Refrigerant **recovery** from all systems. **Record keeping.** Use of appropriately qualified personnel
31st March 2008	Annual **Reporting** by importers, exporters & producers to DEFRA and the European Commission on quantities of F gas.
1st April 2008	**Labels** (in a standard format) stating amount and type of F gas contained must be fitted to all new equipment.
4th July 2010	Interim personnel and company certification no longer valid. All personnel and companies engaged in leak checking shall be certified.
4th July 2010	**Leakage detection** systems fitted to fire protection systems containing 300 kg or more of F gases – for systems initially installed before 4 July 2007.

This interim qualification runs out in 2010 and DEFRA have recently launched a consultation on the UK regulations that put in to place the official UK schemes for training and certification of companies and personnel. These draft regulations are expected to come into force in February 2009 and as far as fire protection systems are concerned, the regulations list the Fire Industry Association as an examination and certification body for approving companies and personnel to the F Gas regulations. British Approvals for Fire Equipment (BAFE) are also listed in the Regulations. In order to be able to meet this requirement, FIA has been in detailed discussion with DEFRA and will soon launch their training course and examination for F Gas competency. If the regulation proceeds as planned, the course and examination will be ready to run from February 2009 and the FIA is confident that it will have the whole fire protection sector trained, examined and certified by the July 2010 deadline.

This has been a long process to get where we are today, but it has shown what can be achieved when industry and government work together on European legislation. FIA (and its predecessor BFPSA) have been involved in the discussions right from the outset when the regulations were first proposed. FIA was involved in stakeholder groups, both in the UK and Europe, on the F Gas regulations and still takes part in regular meetings with DEFRA and BERR. On the whole I think the F Gas regulations are as near as we can get to industry favourable legislation. The UK regulators BERR and DEFRA have spent a lot of time making sure that enough information is available for industry and end users and that it is the right information. To that effect they have set up a body – "F Gas Support" – to provide support and guidance on the regulations via phone or email. This group has drafted some good guidance documents which can be downloaded from the DEFRA website. The documents can also be found on the FIA website (www.fia.uk.com).

In summary, the F Gas regulations are here and will have a significant impact on the use of gas extinguishing systems in the UK but in a beneficial way as they take us further down the line of proving competency in our industry. It also shows what can be achieved when you are proactive with European legislation; it doesn't always have to be bad news – if we put the right amount of effort in it can work for the benefit of the industry as a whole.

The final table shows the key legislative instruments that make up the F Gas regulation and some of the key dates. IFP

Fire Industry Association

6176-2008

Just because the Dräger X-am 5000

can measure up to 5 gases,

it doesn't mean that it

has to be any larger.

At first glance you would never realize that the new Dräger X-am 5000 personal monitor has grown to meet your requirements. The reason for that is that whilst its capabilities have grown its physical size has not. We have not only developed the smallest 1 to 5-gas detector but we have also enhanced its capabilities with extended functionality, increased operating time and additional flexible application options.
The Dräger X-am 5000 not only detects O_2, CO and H_2S but is also capable of warning when harmful concentrations of CO_2, Cl_2, HCN, NH_3, NO_2, PH_3, SO_2, and organic vapors are present.
A variety of special calibrations for the new EX sensor (which outputs values in Vol.-% as well as % LEL) allow even more sensitivity when detecting combustible gases and vapors.
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Flame detection has taken on a new dimension

Past events have served to demonstrate that fires can spread rapidly, bringing absolute devastation to plant and surrounding areas. Used extensively throughout the petrochem, oil and gas industries, flame detection systems can provide reliable detection of a wide range of hydrocarbon and non-hydrocarbon based fires. Providing an ideal solution to the growing demand for flame detection in industrial applications, they are also being increasingly used alongside gas detection equipment to form a complete safety solution in many other areas of industry.

By Steve Pepperell

Head of GDS UK Portfolio Management, Draeger

Whether it be on or offshore and involve gas turbines, recycling or fuel stores, etc., the type of application is just one of the many considerations that should be taken into account when selecting flame detection equipment. A whole host of variables such as the weather conditions and the position of the sensors can have an equally profound affect on a system's ability to "read" the situation correctly.

Evolving technology has meant that the cost of ownership as well as reliability, accuracy and ease of use have all improved over the past few years. In addition, the latest systems, such as those that boast integral CCTV, are able to overcome many of the problems associated with more traditional methods. For instance, false alarms can be virtually eradicated and the need for operator intervention to investigate alarms can be eliminated – reducing the risk of injury and saving both time and money.

Steve Pepperell, Head of GDS UK Portfolio Management at Draeger, explains how the new technology differs from traditional detection methods.

Fundamentally, there are two types of flame detection technology: Radiation (which includes ultraviolet (UV), single frequency infrared (IR),

combination UV/IR and Multiple Frequency IR), and Visual.

RADIATION FLAME DETECTORS

These types of detector work by determining the total radiation within the field of view, recognising any flicker frequency that might exist, and calculating the intensity of the radiation in that area.

UV Flame Detectors

As all fires give off some UV radiation, a UV Flame detector can be used as a good general purpose flame detector. Suitable for inorganic fires, such as those that are metal based, they can also be used to detect fires that are invisible to the human eye, such as hydrogen. With a fast response time of typically less than 1 second, they incorporate sensors that are usually UV tubes. The tubes generate pulses that are counted – the greater the number of pulses, the larger the source of UV.

However, fires do not emit a large amount of UV radiation and, because UV sensors are very sensitive, they can be susceptible to false alarms from other sources such as electric arc welding, lightning and x-rays. In addition, oil films, certain solvents and foggy weather conditions can absorb UV radiation before it reaches the detector, causing attenuation of the signal. In the worst cases, the detector may even be rendered completely blind. For these reasons, UV flame detectors are best suited to clean, indoor applications.

Single Frequency IR Flame Detectors

IR Flame Detectors are used to detect hydrocarbon based fires and usually sense radiation at 4.4μm – the wavelength at which hot CO_2 gases are emitted from fires of that type. Many IR detectors incorporate algorithms which look for a flicker frequency of 2 to 10Hz. They also ensure that the signals received from the sensor are random in terms of both time and frequency. Whilst the signals associated with fires are always random, the problem of false alarms can occur as a result of hot, modulated black bodies which are usually repetitive in one form or another.

In terms of other potential inhibitors, solar radiation at 4.4μm does not reach the earth's surface and, therefore, has no effect on the detector. Neither arc welding nor X-rays cause false alarms and the device performs as normal when its' optical surfaces are contaminated with oil films or solvents. Water on the optical surfaces, however, will reduce the detector's sensitivity as water absorbs radiation between 4 to 5μm.

UV/IR Flame Detectors

In effect, these instruments combine both IR and UV detectors in a single housing. Both detectors

are required to detect simultaneous radiation before generating an alarm, thereby ensuring the greatest immunity to false alarms. However, whilst they share the benefits of UV and IR systems, they also suffer the same limitations in relation to optical contamination and will be blinded by oil films, airborne substances, water and ice.

Multi-frequency IR Flame Detectors

Multi-frequency detectors were developed to reduce false alarms and to increase detector sensitivity, thereby offering a greater operating distance. The false alarm immunity is improved by using additional sensors known as guard band sensors. The signals from the sensors are correlated at either two or three optical wavelengths depending on the detector type.

The most common detector types are triple channel devices (IR3) which sense radiation at approximately 4.2µm, 4.4µm and 4.6µm and then make a comparison of the ratio between the sensors. As fires emit very strong signals at 4.4 but provide weak signals at 4.2 and 4.6, they provide a ratio that can be measured and which will result in an alarm.

However, the sun emits exactly the opposite with a minimal signal at 4.4 and strong signals at 4.2 and 4.6. Therefore, if the sun is reflecting off a water surface (with the rippling effect of the water adding to the modulation) it will not result in an alarm.

Modulated black body radiation, caused by the detector mounted on a pole and moving in the wind and able to view hot processes, can also reduce the sensitivity of a detector.

Similarly, modulated black body radiation also fails to provide the correct ratio so, once again, no fire signal will be generated. Small fires at relatively long distances of up to around 50 metres are easily detected.

Unfortunately, where more than one incident occurs at the same time, a detector can often fail to respond. For example, because reflected sunlight is effectively the opposite of a fire, reflected sunlight and a fire at the same time will not give a fire signal. In addition, modulated black body radiation, caused by the detector mounted on a pole and moving in the wind and able to view hot processes, can also reduce the sensitivity of a detector.

VISUAL FLAME DETECTORS

These systems use CCTV and advanced algorithms to process live video images and interpret flame characteristics. Whilst some systems simply strap a camera to a standard flame detector, the more advanced systems use the camera itself to detect the flame. As a result, those with an integral CCTV capability offer virtually no false alarms and, as an added bonus, can be used over longer distances. The use of video also means that visual indication can be achieved without anyone having to enter a potentially dangerous environment.

CCTV Flame Detectors

False alarms can be virtually eliminated with this type of system because black body radiation and hot CO_2 emissions have no effect on the CCTV system. The presence of water also poses less of a problem as light is easily transmitted through water and, in any event, the detectors are not concerned with heat energy. Where bright fire images may not be present, the use of live video ensures that even the dimmest of fires can be detected.

By way of example, the new Draeger Flame 5000 is a colour imaging based flame detector. Comprising integral CCTV, this state-of-the-art system uses digital signal processing and software algorithms to process live video images and interpret the characteristics of a flame. The system's advanced imaging algorithms are so discriminating that false alarms are all but non-existent.

The detector can be used as a stand-alone device providing live video, or it can be integrated with a control system or fire panel to provide fault and fire signalling using a 0-20mA signal or relays. As well as the surveillance benefits, this obviously removes the need to despatch operators to investigate alarms, and reduces the risk of injury whilst improving response time to around 4 seconds.

Simple to install with a stainless steel mounting bracket that can be rotated to ensure optimum positioning, this innovative system can be used to detect fires of $0.1m^2$ or more, at 44m within a 90° horizontal field of view. An advanced optical verification facility automatically checks the window for contamination and ensures that this field of view is not compromised by obstructions placed immediately in front of the detector.

A built-in memory card allows the detector to record both before and after every alarm. For immediate, on-site visual verification, a tri-colour LED is located on the front of the detector with green confirming normal operation, yellow signifying a fault and red indicating the presence of radiation.

Light in weight at just 2.5kg and measuring 200 x 100mm, the Flame 5000 can be operated in temperatures ranging from –60°C to +85°C. Supplied with a stainless steel or aluminium finish, it can be used worldwide, is performance approved to FM 3260 Standard, is SIL2 Verified, and meets the requirements of ATEX, IECEx, FM and CFM Approvals.

Further information is available from Marion Mackenzie, Draeger UK Limited, Ullswater Close, Blyth Riverside Business Park, Blyth, Northumberland, NE24 4RG. Tel: 01670 561413. Fax: 01670 544475. IFP

For more information, visit www.draeger.com

Pic courtesy of Jalite PLC. www.Jalite.com

Safety Way Guidance Systems Come of Age!

Evacuation Signs, Paths & Lighting

The story of Low Location Way Guidance Systems (LLWGS) begins around the 1980s where, as so often is the case with developments in fire safety, high profile events highlighted a failing in the fire safety measures of the time.

By Jim Creak

of Jalite PLC

Several aircraft fires and crashes brought to focus that smoke would obscure the exit signs placed near the ceiling causing confusion and panic amongst the passengers. The American Federal Aviation Authority subsequently made it a requirement for a form of pathway marking to be implemented on all aircraft. Thus Low Location Way Guidance Systems were conceived necessary. Further events, more often tragedies, over the next two decades continuously re-highlighted the benefits of WGS, each time in new situations and applications and, of course, always after the event.

1984 – Fire in New Jersey kills 8 in Haunted House ride fire due to obscuration of exit signs by smoke.

1985 – British Airtours Flight 28m. Engine catches fire prior to take off and spreads to cabin, of 136 occupants 48 die from smoke inhalation.

1987 – Kings Cross Fire in London claims 31 lives. Poor evacuation procedures and smoke inhalation was the main cause of loss of life.

1990 – Cruise Ship "Scandinavian Star" catches fire. 184 perish, mainly due to smoke inhalation with smoke obscuring exit signs greatly hindering passenger evacuation.

1993 and 2001 – (See Sections 2 & 4)

The earlier events highlighted the importance of siting WGS in low locations and its use in situations where the environment amplified the dangers of fire. Delayed evacuation times due to unfamiliar layouts and smoke obscured signage meant more people were overcome by fumes, the primary killer in a fire.

Way Guidance Systems, however, were due to undergo something of a revolution. A series of

Pic courtesy of Jalite PLC. www.Jalite.com

events, years apart, would highlight in a startling and shocking way the importance of WGS's in more typical situations and the concept would undergo a re-genesis as a result.

A photoluminescent revolution

In 1993 the World Trade Centre came under attack, a bomb detonated in the underground garage killing 6 persons and in the ensuing evacuation more than 1,000 were injured. It highlighted a dangerous flaw in the evacuation continuity planning of the building. Upon vacating desks and exiting offices into emergency stairwells staff found themselves in complete darkness. The explosion had knocked out the emergency power, including that to the emergency lighting. The evacuation took people from the top floors up to 3 hours.[1] In the ensuing investigations a recommendation of marked simplicity was made. In order to bypass the dependency on electricity for lighting, use photoluminescence.

Photoluminescence is defined by the National Fire Protection Association of America as, "Having the ability to store incident electromagnetic radiation typically from ambient light sources, and release it in the form of visible light." For the World Trade Centre the material presented itself as the ideal product to allow for the contingency of total power loss. Provided adequate lighting was available in times of normal operation and the material had been sufficiently charged the pigments would illuminate immediately upon lighting failure for the likely duration of the evacuation. Important items for safe navigation such as stair edges/sides, handrails and directional signs would all be photoluminescent (Via paint or high durability plastic). Low level continuous strips would also be included for additional light and visual re-assurance. In the event of complete power failure of standard and backup systems people would not be without light and guidance when evacuating.

A perfect system?

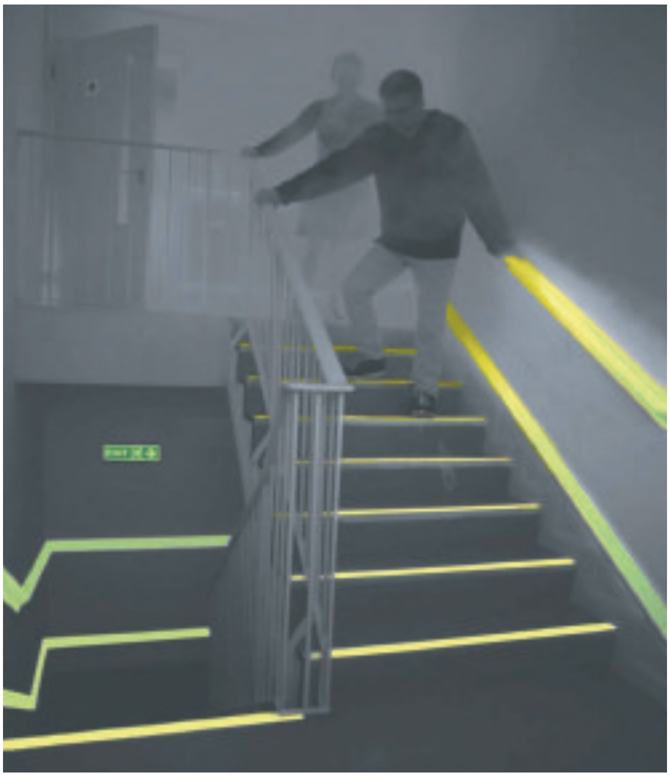
So now we have the concept of a WGS, the necessity to locate it low on the horizontal and a product innovation that makes it independent of interruptible power sources. Its ideal use as a "last resort" backup to a failed electrical guidance system was obvious. But could it completely replace such a system? What of its performance not only in low light but also in dense smoke conditions, these being the most dangerous conditions. The benefits of lower energy consumption and greatly reduced maintenance were such that it begged the question.

In 1998 Geir Jensen of InterConsult Group (formerly IGP AS) began research into "Wayfinding in Heavy Smoke: Decisive Factors and Safety Products."

His conclusions were remarkable. Out of 7 system categories he concluded the following. "Very high performance of guiding people in smoke may be provided by simple non-powered way finding systems; a tactile safety hand rail or photoluminescent marking or both" and also that "Viewing distance, not power or luminance, is the crucial factor at high smoke density…. A photoluminescent strip at 0.5 meters distance to the eye is more visible than the most powerful luminaries at just 1.5 metres." Surely here was proof of the systems effectiveness in the most dire of conditions, should it ever come to be tested in a real life situation its effectiveness seemed guaranteed. Hopefully it never would. . .

Twin tragedies

September 11th 2001 is a day forever in people's memories. There are few who do not know of the terrifying events that befell the twin towers that day. The hijacking and subsequent crashing of commercial airliners into the two towers caused a raging inferno which soon led to the collapse of both structures and the deaths of over 2500



Pic courtesy of Jalite PLC. www.Jalite.com

people. The question for many interested in WGS's was whether the system had helped in speeding the evacuation of survivors? The National Research Council of Canada's Institute for Building Research had conducted extensive research on the 1993 evacuation of the buildings. They surveyed survivors from the 2001 incident and compared the results to the 1993 findings. The results were most interesting.

For Tower 1 evacuees had 1 hour and 42 minutes until the collapse of the tower from time of impact. In 1993 52.6% of people surveyed had taken between 1 to 3 hours to evacuate with 7.8% taking over three hours. The median evacuation time from the 90th floor had been 2.5 hours. In 2001 some people on the 90th and 91st floors reported vacating the building in as little as 45 minutes more than three times than the average from that floor in 1993, a startling improvement. With between 5–7000 people per tower, had conditions been similar to those of the 1993 evacuation this would certainly have meant a much greater loss of life caused by slow evacuation times.

Local Law 26

In the wake of the disaster and the threat of further attacks the New York Department of Buildings passed Local Law 26. Photoluminescent WGS, so clearly beneficial in evacuation both as an aid and as a backup, were to be a requirement in all high rise office buildings across New York, affecting over 1800 buildings.[3] The requirement was to be met by all buildings by no later than July 2006. This task proved something of a problem to building owners and system installers alike who were unfamiliar with the technology and its requirements.

The answer was for the NYCDOB to develop its own standard, later to be known as RS 6-1. It would outline the requirements of a WGS and specifically specified that it was to be a photolumincescent system. It also placed requirements on the quality of system to be installed. A danger of photoluminescence is the use of sub standard materials. Poor quality materials exhibit poor luminosity and duration of operation greatly reducing their effectiveness.

A task force representing the leading authorities on a range of disciplines was assembled, their charge being to develop a standard of excellence for PLWGS's. Their specialties lay in fields such as Architecture, Emergency Management, Building Management and High Rise Evacuation. Geoffrey Peckham, president of Jalite USA, was called upon for his specialist knowledge in photoluminescent technology. Together the task force prepared and published the standard the NYCDOB subsequently implementing the standard via its MEA process. This is a testing standard by which the NYCDOB approves of systems and is known as Materials and Equipment Acceptance (MEA) process. Any system installed as part of RS 6-1 would have to have had previously gained approval through the MEA process.

Assuredly any PWGS to be installed anywhere in New York, high or low rise, would be prudent to install a RS 6-1 compliant system with approved materials as a function of this. For any installation elsewhere in America ensuring it is to RS 6-1 standard will undoubtedly go a long way to proving a commitment to safety in the wake of a tragedy.

The last leg of the journey

So the concept of a non-electrical photoluminescent way guidance system has matured. It has been conceived out of tragedy, believed to work by the pioneers of its uptake, tested to work by safety research professionals, proven to work in the most phenomenal way by incident and made a standard of safety as a result. The reason for all this is simple. The system is easy to test, certify and now accredit under independent 3rd party quality assurance schemes (as listed below). Most importantly above all is its proof of effectiveness not when emergency comes but by the simple flick of a switch, each time you turn out the lights.

Governing Standards For Photoluminescent Products:

NFPA 101 – Life Safety Code

UL-924 – Standard for 'Emergency Lighting and Power Equipment'

NYC MEA approval – Photoluminescent Products in High Rise application

ISO 15370 Ships and marine technology – Low-location lighting on passenger ships **IFP**

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The history of modern water mist fire protection

On behalf of International Water Mist Association
By Max Lakkonen

Manager, Design and R&D, FOGTEC Fire Protection

The effectiveness of water as a fire fighting agent has always been known. Applying water with fixed fire fighting installations started already in the 19th century when sprinklers were invented and the design of sprinklers has not changed a lot from the early days.

Conventional sprinklers remain the main technique for fixed fire fighting installations around the world. An alternative and innovative water based fire fighting solution has been developed extensively over the last almost 30 years. The development of the so called modern water mist fire fighting technology was driven by the drawbacks of conventional sprinklers and gaseous systems. Water mist fire fighting today has achieved a well established position in fire protection and it has become an accepted alternative solution for a large number of applications.

Water mist fire fighting is in point of fact quite an old idea which has been tested and developed in several contexts and locations around the world for many decades. The *International Water Mist Association* has started to assemble this historical evidence. This article presents the current status of this accumulated knowledge. Some parts of the history are already well known and documented. A good example of such is the high-pressure water mist development in Sweden during 1975-1990, which can be identified as the real start of modern water mist technology. But there probably have been many efforts and trials that are not publicly known. This article wants to start the discussion in order to finally collect the history of water mist fire protection as one story. The main focus in this article is in high-pressure water mist since this has been the main stream of modern water mist fire fighting after the technology was commercialized.

Early days before 1950 – A possible alternative

The origin of modern water mist technology leads back to the use of small or fine droplet sprays. The first known efforts were done for manual fire fighting in the USA. For example the company F.E. Myers from Ashland Ohio, USA, was selling a back-bag system with a lance producing small water droplets to fight small forests fires already in 1880. This technology gained more reputation in the beginning of 1900s when the pumping equipment and new sealing materials were developed. Higher pressure levels made it possible to create higher fluxes of small droplet sprays. The first pioneers also recognized the extreme efficiency of small droplet sprays compared to conventional sprinkler systems. Already in the 1930s there were several companies offering systems that applied finely atomized water in form of mist or fog *(also the terminology fog and mist was already used)*. For example, the company Lechler of Metzingen, Germany presented during this time the same key

Herzog water mist nozzle from 1986

benefits of water mist *(cooling effect, oxygen displacement and low water damages)* that are still used as the main arguments when promoting the water mist technology nowadays. The key innovation of Lechler was a multiple orifice nozzle called a water dust nozzle. There were some scientific and non-scientific activities with small droplet sprays with fixed installations in this era. For example, Factory Mutual's engineering division carried out a test series with small droplet nozzles fighting 19MW gasoline fires in the 1940s. The performance was noticed to be comparable with conventional sprinklers whereby the flow rates were much lower. Many fire brigades in Europe and the USA adopted water mist fire fighting as a manual fire fighting strategy. The fire fighting tactics with water mist were developed especially by the US Marine corps in the 1940s.

During the early days of water mist fire fighting the effectiveness of water in the form of mist was already well understood. Water mist fire fighting was seen as a possible alternative. However, commercially and technically water mist systems were not yet seen to be competitive for fixed installations. The idea of replacing conventional sprinklers with water mist systems was not really feasible during these times. The pressure levels of the applied systems were still well under the ones of today's systems mainly due to the lack of suitable components. The water mist technology was therefore mainly applied for manual fire fighting.

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Time between years 1950-1970 – Random efforts

The development between the years 1950-1970 can be summarized in general as a time of random efforts, because there were independent research activities in both the US and Europe. However, these activities were not systematic but rather trials. The commercial interest was also still at a low level. The main research work was carried out by research institutes and scientists. Commercial companies had been more seldom involved. The main focus was still in conventional sprinkler systems but also other new technologies like powders and especially systems utilising gases.

However, there were some efforts taken for example by FM in the USA and A. Herterich in Germany. Also D.J. Rasbash started his research work with fine droplet sprays in this era. There are some other names and research groups that have worked with water mist or fine water sprays in this time period but the documentation does not exist anymore or is not known to the author.

Time between years 1970-1990 – Early development of modern water mist technology

The development of water mist fire fighting changed a lot during this time period. The basic knowledge of small droplet sprays and their effect on fire had been generated and made public by the first pioneers many years ago. Meanwhile supporting technologies like hydraulic systems using high-pressure had become commonly known in other industries. The logic consequence was to increase the working pressures of water mist systems to provide more energy at the nozzles for the splitting up of the water and the acceleration of droplets.

There were several separate research groups that were working with water mist fire fighting techniques simultaneously in different parts of the world. Probably some groups even did not know the efforts of others involved in the very same topic. The main stream was changing from lower pressures to higher ones. This meant that droplet sizes were decreasing. Names like Vincent, Beyler Pietrak&Patterson and Rasbash can be mentioned in connection with this research in fine water spray fire fighting. A probably less familiar name is Hans-Joachim Herzog from former GDR *(Deutsche Demokratische Republik)* who worked intensively with low- and medium pressure water mist since the beginning of the 1980s. His company's products were actually installed in a number of industrial and public buildings like e.g. the Leipzig

Bowling Center in the middle of the 1980s.

However, the development work with the strongest impact on modern water mist technology probably originated from Sweden. The development there was started by Krister Giselsson, a teacher of the Swedish Fire School. He developed jointly with his colleague Mats Rosander a new manual fire fighting tactic against indoor fires. This so called offensive fire fighting was based on applying small droplet sprays in short bursts to cool the combustion gases effectively without disturbing the thermal balance or creating large volumes of scalding steam. On the basis of their experiments for manual fire fighting Giselsson and Rosander started to develop a fixed water mist system in the beginning of the 1980s. They co-operated with the company Electrolux Euroclean, which was a high-pressure cleaning company. Electrolux Euroclean got the inspiration to develop high-pressure water mist fire fighting systems as a result of an accident in which their cleaning equipment was used to extinguish a deep fat fryer under fire. The key people in Electrolux Euroclean were Omar Vestli, Håkan Ungerth, Bengt Crener and Sten Hansen. Electrolux Euroclean did not have fire engineering knowledge so Giselsson was consulted by them. Giselsson got support by high-pressure equipment from Electrolux Euroclean in return. There were several fire tests and demonstrations organized by these two developer groups in Sweden during 1981 to 1983. Electrolux Euroclean carried out a series of tests in the Swedish research institute SP in order to prove and demonstrate the performance of the new technology since there were not references available. The pressures used ranged between 120 and 150bar and standard industrial nozzles were used. Electrolux Euroclean started to develop an own glass bulb activated *(sprinkler)* water mist nozzle in the middle of the 1980s. The company name was changed to HTC after the key people, working with fire fighting, bought the rights for water mist fire fighting from Electrolux Euroclean. HTC was focusing only on high-pressure water mist fire protection.

The impact of the coming change in environmental thinking was already noticed in the late 1980s when the Montreal Protocol was signed.

During the late 1980s also some other approaches with fine spray systems were made, but only very few with extremely fine atomized water. The extensive work of P.G Papavergos with small droplet sprays generated by dual fluid nozzles can be mentioned as an example. Further the widely known American research for aircraft protection.

Electrolux Euroclean (HTC) automatic nozzle prototype from 1985 and deluge nozzle from 1983 tests (photo by Håkan Ungerth)

The period from 1970 to 1990 can be summarized as a time of early development of modern water mist technology. All benefits of applying especially high-pressure water mist had been discovered and an early commercial system had already been marketed in Sweden. The technology was already very advanced in that time. Both deluge and heat activated nozzles *(water mist sprinklers)* were in their design principals very similar to the ones which can be seen in the market today. Mainly the size of the nozzles has decreased and the activation time of automatic nozzles has become shorter. Small droplets with different spray characteristics created from high pressure water *(80-280bar)* were used by the Swedish pioneers. The time was just not yet right for the breakthrough but first signs of change were seen.

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Time between years 1990-2008 – Breakthrough of modern water mist technology

The year 1990 is very important for the history of modern water mist technology. As many times before the change was finally triggered by a catastrophe.

A serious fire broke out on the passenger ferry "Scandinavian Star" in the early morning of April 7th in 1990. The result of this incident was that 40% (157 people) of the passengers did not survive the disaster. This was the final alarm for the marine industry and authorities who understood the problems related to common fire safety strategies. The amount of water needed and heavy

piping made it almost unfeasible to use "classic" sprinklers to protect ferries. This was the time for the pioneers to present their solution. The key event probably was the fire demonstrations in Bålsta, Sweden on the 20.6.1990. The demonstrations were carried out by a new company Ultrafog founded by Krister Giselsson, Sven Brutsner and Stephan Forsström. The focus of this company was to market a high-pressure water mist fire fighting technology to the marine sector. Cabin fires with and without the use of a high-pressure water mist system were shown and a number of people from shipping companies, insurance companies, fire & rescue services and some other companies from the marine industry witnessed the demonstrations. For example the Finnish company Marioff KY, in these days a high-pressure piping company was among the invited parties in the Bålsta demonstrations. Only half a year later Marioff started their own development of high-pressure water mist fire fighting products. Marioff became the first commercial success story with water mist fire fighting supported by their knowledge in hydraulics and high-pressure piping.

The application areas for water mist have rapidly increased ever since. Such in the food industry were among the first land based applications. Soon the technology was adopted by the IT-industry and heritage buildings. Environmental and safety aspects have continuously gained importance which consequently has limited the use of various gaseous fire extinguishing agents. This again continues to be a main driver for the further development of modern water mist technology.

The foundation of the *International Water Mist Association (www.IWMA.net)* in 1998 is another important milestone in the history of the modern water mist technology. The purpose of the IWMA is to bring together all parties having an interest in water mist fire fighting. Today manufacturers, major research institutes, leading approval bodies, installation companies and engineering offices are part of the IWMA. They jointly promote the technology, at the same time giving advice on good practices to make its use safe and efficient.

The increased interest in water mist is well reflected in the development of IWMA; there were only 5 corporate members in 1998, nowadays there are more than 50 of such all around the world. The annual IWMA conference is a well known meeting point for the water mist industry.

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The years after the Bålsta fire demonstrations were a time when several other companies were noticed as being involved in work with high-pressure water mist. The Swedish pioneers continued, but also at least Danish, Norwegian, German, English and Japanese companies were either developing and, or marketing high pressure water mist systems. The first large marine installations for accommodation areas were realised in 1992 *(M/s Danica, M/s Festival and M/s Karneval)*.

The success story of modern water mist technology in the marine market was supported by IMO, *International Maritime Organization*, which accepted water mist systems as an alternative for conventional sprinklers. Several IMO resolutions during 1994 and 1995 accelerated the use of water mist in the marine industry. The requirement to replace Halon systems was gaining momentum during the same time period, what brought the water mist technology into machinery spaces and similar applications also on shore.

However, the wider use of modern water mist technology has taken a much longer time for the land based market than for the marine sector. An important starting point was a first standard created by NFPA. The standardization work started in the year 1993 and a first *NFPA750 Standard for Water Mist Fire Protection systems* was published in 1996. Nowadays there are also other standards and official guidelines for water mist available like FM5560, CEN TS14972, APSAD D2 and UPTUN 251.

Over the recent 20 years the market for modern water mist systems has steadily grown. According to market estimations by IWMA the Marine sector has started to stabilize, although some new application areas have lately been explored. Presently the major part of growth is coming from the land based market and a number of new applications. Water mist presents still only a small part of the fire protection industry compared to the market for sprinklers and gaseous fire fighting systems. However, since the fire demonstrations in Bålsta, Sweden in June 1990 modern water mist has continuously made its way in becoming a well accepted technology for the protection of risks previously unprotected as well as an alternative to traditional techniques. The many advantages of the modern water mist technology are the basis to the continuation of this success story.

Acknowledgements

Acknowledgments to all pioneers that have been in contact to the author so far *(especially Håkan Ungerth, Krister Giselsson and Mats Rosander)*. Also the work of Magnus Arvidson *(SP, Sweden)* regarding the Swedish part of the history is greatly acknowledged. His comprehensive article about the water mist history in Sweden can be downloaded from IWMA webpage under IWMA conference 2008 (www.iwma.net). IFP

WANTED!

Do you know more details about the history of water mist or do you have some material?

The author of this article is working on more comprehensive publication about the history of water mist fire fighting and asks your help to collect further information. Wanted are respective literature, tests reports, early components, brochures, videos, photos or just your verbal information. If you are able to support this work, please contact the author by phone +49-221962230 or by email history@IWMA.net

Suppression syste

– Sustaining peak performance

By Mick Gay

Senior Project Manager, M J Quinn Integrated Services

Despite a growing mass of legislation requiring the proper maintenance of fire suppression systems, too often it is still the Cinderella of the fire safety industry. Here, Mick Gay, Senior Project Manager at M J Quinn Integrated Services, which is responsible for what is probably the UK's largest fire safety system maintenance contract – covering the total Fire Assets on London Undergrounds Jubilee, Northern and Piccadilly lines for their client Tube Lines Limited – outlines what is needed to ensure that fire suppression systems continue to function at peak performance.

Just about everyone in the fire safety business has a maintenance horror story to relate. It does not matter whether you are in Dubai, Dubrovnik or Doncaster, the same themes keep occurring time and time again. Tales abound of servicing engineers who turned up with neither tools nor test equipment; maintenance companies that are completely devoid of any documentary evidence of the systems being maintained; clock-in, clock-out records that defy belief that the work has been carried out with any diligence; and "specialist" companies that employ staff with little but cursory training – the list just seems to be endless.

Of course, what makes this even more alarming is that this situation exists at a time when, internationally, legislation is demanding that system testing and maintenance is undertaken by competent people, to the prescribed regimes, and that accurate documentation is kept. It is also when the risk assessment approach to determining fire safety and the growth of fire engineered solutions is making both property protection and life safety even more dependent upon the reliable and effective operation of fire safety systems.

Just consider the legislation in the UK. Under the Regulatory Reform (Fire Safety) Order, the onus for fire safety falls on the designated "responsible person", who frequently delegates part or all of his or her duties to one or more specialist companies to ensure compliance. However, it remains the duty of the "responsible person" to ensure – and the word "ensure" is worth remembering – that

m maintenance

fire safety systems remain functioning correctly and are properly maintained at the appropriate intervals. The recently introduced Approved Document B (Fire safety) of the Building Regulations for England and Wales underpins this fire safety management obligation by flagging-up that a failure may well result in prosecution. In terms of keeping proper maintenance records, the Document includes: ". . . a requirement to provide sufficient information for persons to operate, maintain and use the building. . . ."

More recently the Corporate Manslaughter and Corporate Homicide Act has, or at least should have, made boards of directors aware of their legal responsibility to ensure a sounder culture of safety. This has now been followed by the new BS 9999:2008 (*Code of practice for fire safety in the design, management and use of buildings*) that establishes a decisive link between fire safety and the use of the building.

That is quite a clutch of legislation by any country's standard. However, even in countries that have as yet to adopt such legislation, the trend towards more and more buildings being constructed using fire engineered solutions rather than prescriptive measures is evident. The protection in these buildings is often ultra-dependent on the reliable operation of fire safety systems.

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Legislative landscape

Fire suppression comes in a number of forms. Some systems are fixed, while others are portable; they may utilise any number of inert gases, chemical agents, foams or water. There are applicable regulatory standards for each and, while standards vary from country to country, the UK and European regulations are well defined and are indicative of the standards adopted, or under serious consideration, elsewhere.

In the UK, water-based sprinkler systems are becoming ever more popular, and their testing requirement depends on whether the installation is for life safety or property safety. If the intention is life safety, it is considered to be a "relevant system" under the Fire Safety Order. It must, therefore, be maintained to the relevant British Standards. These are BS EN 12845:2004 (*Fixed firefighting systems. Automatic sprinkler systems. Design, installation and maintenance*) or BS 5306-2:1990 (*Fire extinguishing installations and equipment on premises. Specification for sprinkler systems*). BS EN 12845 specifies requirements and provides recommendations for the maintenance of fixed fire sprinkler systems in buildings and industrial plant, together with particular requirements for sprinkler systems that are intended for life protection.

If the sprinkler system has been installed for property protection, it is not a "relevant system" as defined in the Fire Safety Order and, under the Order, there is no expressed requirement for the system to be tested. However, the property's insurer may take a very different view!

BS ISO 14520-1:2006 (*Gaseous fire-extinguishing systems. Physical properties and system design. General requirements*) covers the performance testing, inspection and maintenance of gaseous systems generally, while other parts of the Standard relate to specific agents. Foam systems are covered by BS 5306-6.2:1989 (*Fire extinguishing installations and equipment on premises. Foam systems. Specification for medium and high expansion foam systems*) and BS 5306-6.1:1988 (*Fire extinguishing installations and equipment on premises. Foam systems. Specification for low expansion foam systems*). The maintenance of portable fire suppression equipment is covered in BS 5306-3:2003 (*Fire extinguishing installations and equipment on premises. Code of practice for the inspection and maintenance of portable fire*

extinguishers). It provides schedules for the maintenance of portable fire extinguishers installed in all locations.

Delivering compliance

The reality of compliance though is that few commercial or industrial organisations have the competence to undertake fire suppression system maintenance to the required standards, so invariably turn to specialist maintenance contractors. The challenge comes in finding a contractor whose commitment is to ensure that the system is operating properly, rather than one that adopts a "tick the box" approach. So, how can confidence in the maintenance regime be established, and how can the competent maintenance contractor be identified?

The first step is to ensure that the testing and maintenance requirements are fully understood by talking to the system designer and installer, whomever is responsible for the building's fire risk assessment and fire strategy, and possibly the building's insurer. The next step is to ensure that all of the maintenance documentation is read and understood both by the building occupier and the maintenance contractor and that robust protocols are in place to store and update the information and that a reliable mechanism exists to flag-up what actions need to be taken and when.

For the maintenance of large or complex systems, or when the contract spans over a number of buildings or sites, a paper-based recording system is simply inadequate. M J Quinn's solution to this now common challenge was to develop a computer-based planned preventative maintenance software system called Qu-Trak. This is the central point of contact for all maintenance issues, and supports the company's 24/7 service call desk. Qu-Trak also provides a complete and reliable audit trail of all maintenance activity, ensuring that both the company and the building owner are continuing to comply with any legislation that demands that system maintenance be properly documented.

Ensuring competence

However, no matter how well the maintenance regime is recorded, its success remains dependent on the operational competence of the maintenance contractor. Perhaps this is one aspect of maintenance where a "tick the box" approach is, in fact, appropriate. For example, any maintenance organisation that uses anything other than directly-employed staff should be immediately discounted, because relying on sub-contractors defeats the whole object of assessing the ability and experience of the appointed contractor. In short, you need to know precisely who you are employing.

Next, the company should use only a maintenance contractor that meets the rigorously applied standards of such an organisation as the UK's LPCB (Loss Prevention Certification Board), as this is the only way of ensuring that the people undertaking the maintenance work have been independently assessed as truly competent. When it comes to sprinkler systems, this means a maintenance company that is approved to LPS 1048. Insisting on a company that is also accredited to BS EN ISO 9001:2000 (*Quality management systems. Requirements*) is also a prudent move as it provides the essential confidence that the company does precisely what it claims to do.

The company should use only a maintenance contractor that meets the rigorously applied standards of such an organisation as the UK's LPCB (Loss Prevention Certification Board), as this is the only way of ensuring that the people undertaking the maintenance work have been independently assessed as truly competent.

It is also important that the company has staff that has been trained by system manufacturers, because systems vary between one producer and another and it is critical that staff are fully conversant with the system they are testing or maintaining. And this needs to be coupled with in-house training. One way of gauging this commitment to training is to appoint a company that has its own fully equipped training facility that incorporates the latest systems, and that employs – either directly or indirectly – suitably skilled trainers.

Finally, before signing a contract with a maintenance contractor, it is well worth insisting on establishing clearly defined KPI (Key Performance Indicator) benchmarks to monitor achievement against agreed performance criteria. These should cover more than just continued compliance with any regulatory standards. KPIs should embrace every critical aspect of the contract including technical competence, health & safety performance, fault rectification call-out response times, site security compliance, and any planned preventative maintenance objectives.

This information will undoubtedly prove invaluable when objectively reviewing the performance of the contractor throughout the life of the contract. IFP

Mick Gay is Senior Project Manager with M J Quinn Integrated Services in London. He is a qualified fire engineer and, prior to joining M J Quinn, worked for London Underground, Network Rail and Tube Lines Limited, implementing major fire safety improvements.
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Selecting and Placing Gas Detectors for Maximum Application Protection

Many industrial processes involve dangerous gases and vapors: flammable, toxic, or both. With the different sensing technologies available, and the wide range of industrial applications that exist, selecting the best sensor and locating them properly for the job at hand can be a challenge.

By Dave Opheim

Detector Electronics Corporation

To ensure a high level of safety, know the latest sensing technologies, which technology is best for the application, and where detectors should be installed for maximum protection.

General Introduction to fixed gas detection

Portable gas detectors are small, lightweight, and move with the user; many are disposable. Fixed gas detection systems, on the other hand, are designed for installation at a stationary location and are expected to provide long-term service life and protection. This article addresses fixed gas detection only. Three main types are generally offered: point-type, open-path, and analytic or sampling detection systems.

Point-type gas detectors

Point-type gas detectors can be fitted with either combustible or toxic gas sensors. These detectors monitor a specific area or point within the facility and must be strategically located for early detection of gas. These detectors require calibration for the gas type to be detected. Point-type detectors also must be routinely inspected to ensure they are capable of performing as expected.

Open-path or line-of-sight gas detectors

Open-path, or line-of-sight, gas detectors monitor the presence of combustible hydrocarbon gases within a beam of infrared light projected between a pair of modules. To ensure that the gas/vapor hazard passes through the light beam, the modules must be strategically located and properly aligned. As with point-type detectors, open-path detectors must be calibrated for the gas type to be detected. Typically, open-path detectors are self-monitoring in the case of a blocked light beam or similar trouble.

A pair of open-path gas detectors detect gas in the air between the two sensors

Point gas detectors detect gas in the air within a defined radius of their sensor

Analytic/sampling gas detection systems

Many point-detection and analytical instruments use a sampling system technique to extract an air sample, direct the sample to a sealed sensor where it is analyzed, and then exhaust or return the sample to a safe location. Sampling system components typically include a vacuum pump, sensor(s), flowmeters, filters, and flow control elements. They are generally mounted on a subplate installed within an enclosure with compression fittings for sample tubing connections.

Gas Alarm Threshold Settings

Fixed gas detection systems provide alarm output signals to alert people and initiate corrective action. The alarm settings must be low enough to ensure the safety of people and equipment, but should not be so low as to cause false alarms, sometimes caused by background gases, sensitivity to other gases or vapors, or sensor signal drift. If false alarms are a problem, one option is to use voting: two detectors must detect hazardous gas levels before the alarm activates. In determining optimum alarm levels for fixed gas detection systems, consider the following:

- Applicable industry standards or codes
- Fire/explosion risk of the gas(es)
- Toxicity of the gas or vapor
- Typical background gas levels
- Size and magnitude of the potential leak
- Whether the area is occupied or unoccupied
- Time required to respond to the alarm
- Corrective actions required

Performance Requirement	FM 6310/6320 (2001) ANSI/ISA-12.13.01 (2000)	CSA C22.2 #152 (1988)	EN 61779-4 (2000) IEC 61779-4 (1988)
Unpowered storage	X	X	X
Calibration and adjustment	X	X	X
Stability	X	X	X
Alarm set point(s)	X	X	X
Temperature	X	X	X
Pressure			X
Humidity	X	X	X
Air velocity	X	X	X
Orientation			X
Vibration	X	X	X
Warm-up time			X
Time of response	X	X	X
Flooding	X	X	X
Power supply variation	X	X	X
Voltage transients		X	X
Electromagnetic field	X		X

Selecting Gas Detectors

Third-party approved

Fortunately for users of fixed gas detectors, a number of independent agencies now have documented safety and performance criteria for fixed gas detectors. Manufacturers must submit their instruments to these agencies, or affiliated test labs, for testing to ensure compliance with the standards and mark their product as "certified." Independent product safety and performance certification benefits end-users by providing a level of assurance that the product being considered for purchase is actually fit for duty. Above is a summary table of agencies and criteria to which they require compliance.

Intelligence

The latest fixed gas detection instruments and systems often offer on-board digital intelligence, meaning they deliver diagnostic capabilities, historical data logging, digital communications protocols, and provide additional microprocessor-based functionality. The most dominant digital protocols include HART and RS-485 Modbus, although proprietary digital protocols are also available.

Mean time between failure

New gas sensing technologies are available that significantly improve the mean time between failure. Foremost of these new technologies are non-dispersive infrared (NDIR or simply IR) optical gas detection devices that sense the presence of flammable hydrocarbons based upon their tendency to absorb infrared energy in a certain wavelength. This nondestructive measurement technique results in overall excellent service life expectancies, as long as 10 years in some cases.

Sensing technologies for combustible gases

For detection of combustible gases, the most common choices are catalytic and infrared sensors.

Catalytic sensors detect a wide range of combustible vapors, including hydrocarbon, hydrogen, and acetylene. Catalytic sensors offer good repeatability and accuracy with fast response time and low initial cost. A catalytic sensor's greatest weakness is that at high combustible gas concentrations, there might be insufficient oxygen to catalyze all of the combustible gas, resulting in a decreased signal of gas concentration less than 100% LEL. Catalytic sensing requires routine calibration (typically every three months or less). Catalytic sensors are susceptible to poisoning from exposure to a substances such as silicones, halogens, tetraethyl lead, acid, pvc vapors, and other corrosive materials. Sensors can fail without annunciation, hence the requirement for routine calibration or bump testing.

Infrared (IR) detectors are immune to poisoning from contaminants and require less maintenance than catalytic. They are unaffected by prolonged exposure to gas, high gas concentrations, and changes in oxygen level. Unlike catalytic sensors, some IR detectors are fail-safe, meaning that the instrument checks itself and reports any internal condition preventing detection capability. IR sensors can detect only hydrocarbon-based gases and vapors. IR sensors do not detect the presence of substances such as hydrogen (H_2), carbon disulfide (CS_2) or acetylene. Apply IR sensors in combustible-gas applications where hydrocarbons are present.

Sensing technologies for toxic gases

Currently, two main fixed-detector families are available to detect toxic gases: electrochemical cell and Metal Oxide Semiconductor (MOS) sensors.

Generally considered the workhorses for toxic gas detection, electrochemical sensors are relatively

Nanotechnology MOS (NTMOS) sensors significantly improve MOS performance in both arid and humid environments

stable, repeatable, and consistent. Used to detect a wide range of different toxic gases in a variety of different applications, electrochemical sensors are available in different sizes and packages. Electrochemical gas sensor limitations include restrictions in very hot and very cold environments. Some sensors use an electrolyte that can evaporate in hot arid conditions. They are generally not fail-safe, meaning they must be visually inspected and routinely calibrated to ensure proper operation.

MOS sensor strengths include long life, wide operating temperature range, and excellent performance in low humidity environments. Historically, MOS sensor stability was not ideal in regions prone to major changes in ambient relative humidity. However, nanotechnology MOS (NTMOS) sensors are now available that significantly improve MOS performance in both arid and humid environments. These new sensors also enhance sensor speed of response to dangerous hydrogen sulfide gas concentration levels.

Installation and Coverage Recommendations

Although gas detection system design and performance requirements exist through some regulatory authorities, there are no documented rules concerning optimum detector placement or quantity requirements. Hazardous operation (HAZOP) analysis, along with proper planning and placement of sensors is the first step in protecting workers and assets from gas hazards within any facility. However, best practices show that identification of most-likely sequence of events leading to a gas leak, and typical environmental conditions during the leakage, are the best way to identify optimal sensor installation points.

Where and how many?

Consider these factors when evaluating optimal placement and quantity of gas detectors: gas or vapor source, ignition source, gas density or buoyancy, location (indoors or outdoors), ambient temperature, and personnel location.

Gas or vapor source: To locate potential gas or vapor sources, review Process and Instrumentation Diagrams (PIDs), facility maps, and hazardous-area classification drawings. Evaluate the characteristics of potential sources including pressure, amount of source, source temperature, and distance. Common areas for releases include pump and compressor seals, instrumentation sources, valve seals, gaskets, and sample points.

Ignition source: After determining the presence of combustible gas, identify sources of ignition – sparks or high-pressure gas release areas. Place the detector between the ignition source and any potential source of the gas or vapor.

Gas density, or buoyancy: Gas or vapor that is less dense than air (1.29 g/cc at normal conditions) will rise in still air. Gas or vapor that is denser than air will settle to lower elevations in still air. The detector typically should be placed 45.7 to 61 cm (18 to 24 inches) above level where the gas would settle. Remember that temperature affects the density of a gas. Heating decreases the density of a gas and makes it lighter. In fact, heating or cooling a gas by 30°C (54°F) changes the gas density by approximately 11%. Pre-stratification by thermal sources can delay or prevent gas detection near heated areas or ceilings. This typically occurs where heat sources are near the ceiling or where roof decks are heated by solar radiation and no suitable mechanical ventilation is provided. If such pre-stratification potentials are present, then placement of the detector in area(s) unaffected by the stratification is recommended.

Indoors/outdoors: The environmental setting greatly influences vapor dispersion characteristics and gas detection ability. Typically, indoor settings mean that the overall hazardous area is well contained and that air flow can be identified and controlled. Ceilings and walls usually are the likely areas for gas accumulation and area delineation. Point(s) of human contact are usually identifiable. Outdoor settings mean the air flow is less controllable with few distinct areas of gas accumulation. These areas present a challenge that requires comprehensive application analysis and sound engineering judgment.

Ambient temperature: Determine the maximum ambient temperature. Include all nearby hot surfaces, such as motors, pumps, or steam lines. The maximum ambient temperature plus a safety factor of 50°C to 60°C should be less than the flash point of the monitored gas.

Location of personnel: Particularly in situations dealing with toxic gases, it is extremely important to consider the locations of people at the facility. To place a sensor accurately between the leak source and the people, review PIDs, facility maps, and hazardous-area classification drawings.

Useful accessories

The availability and routine use of gas detection system accessories often ensures proper application, operation, and maintenance of an installed gas detection system. Typical useful accessories include compressed gas calibration kits, sensor separation kits, remote gas-tubing kits, duct-mount adapters, and handheld communicators.

Combination of open and point

Optimal protection of a facility can be achieved through the simultaneous use of both open path and fixed gas detectors. Point detectors should be installed at or near known high-risk gas leakage points or accumulation areas to provide specific information on the level of gas present at these areas. Open-path gas detection systems should be installed at plant or process area boundaries, where they can monitor the plant perimeter, and provide an indication of overall gas cloud movement in and out of the facility. It is possible to indentify and track the movement of gas clouds throughout the facility by monitoring the output signals of all the gas detectors on a common workstation graphic display screen.

Technology and Technique

Gas detection design relies on both technology and technique. After becoming familiar with the tools of the industry, talk with detection system providers. They will know the most effective ways to install and use the devices and system.

In general, look at process design drawings and consider where gas leaks can happen. Make sure you are using the proper technology to see the hazard. Look seriously at the safety standards you are required to meet and judge whether devices have undergone full third-party testing. And take full advantage of the experts that know the safety devices and system you decide to implement. IFP

Dave Opheim has over 20 years' experience in flame and gas detection and is currently regional manager with Detector Electronics. Our web address is www.det-tronics.com

Passive Fire Prote Insulation

The importance of increasing insulation content in buildings to improve their energy efficiency must be balanced with a clear understanding of different insulation materials' performance in the case of fire. Rockwool's managing director, Hans Schreuder, examines this in relation to the legislative responsibilities for fire safety and use of fire resistant materials.

By Hans Schreuder

Managing Director, Rockwool

Fire-related incidents in residential dwellings and commercial buildings result in a terrible cost to lives and property. There were 84,500 reported building fires and a resulting 343 fatalities in the 12 months ending September 2007. The cost to the UK economy has previously been estimated at £2.5 billion a year.

As such, legislation to help reduce fires is constantly under review. The most important recent piece of fire regulation for building design and construction is the 2005 Regulatory Reform (Fire Safety) Order (RRFSO), which superseded the Fire Precautions Act of 1971, the Fire Precautions (Workplace) Regulations (Amended) of 1997 and many others.

The RRFSO is supported by another piece of legislation, the Fire and Rescue Service Bill (FRSB), which as introduced in 2006, followed by the current fire safety standards for building construction and materials, set out in Approved Document B2 of the Building Regulations in 2007.

All this legislation and the related Building

ction – Fire Rated

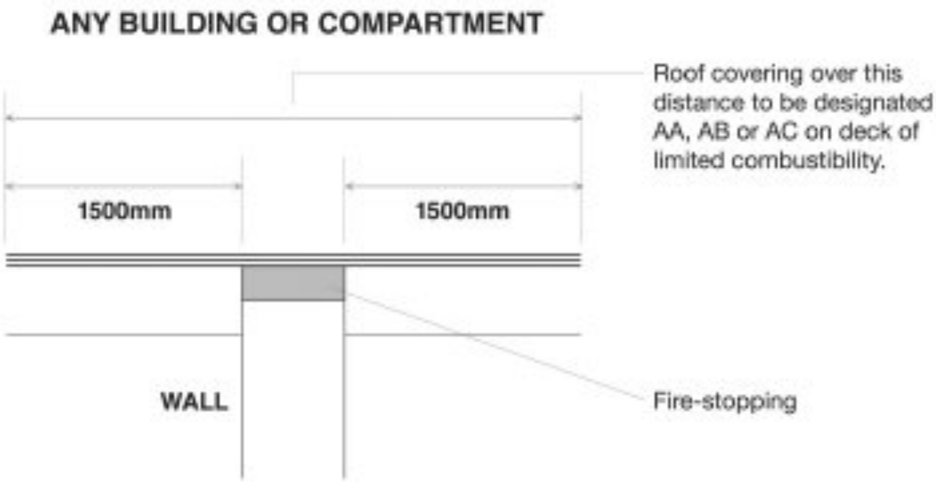


Figure 1. Compartment wall diagram

Standards have a significant influence on specification of building materials and design for improved fire safety.

Clarifying the responsibilities

Put simply, the changes made by the RRFSO mean that fire safety in a building has become the responsibility of all parties involved in the design and build process, from the architect to the building owners and the employers who lease a building. All should satisfy themselves that the building materials, methods of construction and design meet the relevant standards for safety.

As a part of this, the designer must identify and address potential fire risks in materials and design, and the contractor should be trained and certificated in fire safe construction where this is specified. Importantly, any potential fire risk – including the use of combustible products in the construction – must be communicated to the other parties so that responsibility for ensuring fire safety is shared; ignorance is no defence.

Applying this to new build is one aspect, of course. Retrospectively applying it to existing construction is more difficult. However, all substantive building changes, refurbishments, extensions etc. should be designed and specified to the highest standards of fire safety and if, in the course of this, fire risks are discovered, they should be mitigated.

This means that the building owners and users must now have a much greater awareness of the importance of approved design and build detail, and especially the fire safety of different materials used in construction. They should not passively assume compliance.

Passive containment design

One of the main methods of combating fire spread is to create sealed compartments throughout a building to ensure that the fire is contained within the area of its origin.

This concept has been adopted by all the regulatory authorities in the United Kingdom and the Republic of Ireland. The specific legislation covering England and Wales is Approved Document B of the Building Regulations, with the section ADB2 being applicable to all buildings other than single dwelling houses.

ADB2 addresses the problem of fire spread via roof structures which traverse the head of a compartment wall and provides guidance on minimising this risk through the use of decks and substrates made from materials of “Limited Combustibility”.

Paragraphs 8.29 and 8.30 of ADB2 state that a zone of the roof, 1500mm wide on either side of the wall (commonly referred to as the protected zone), should have a covering of designation AA, AB or AC on a substrate or deck of material of limited combustibility (see Figure 1). This design detail applies to all non-domestic buildings over 15 metres high and also, irrespective of height, all hospitals, schools, warehouses, factories and shopping centres.

In practical terms this means that a roof structure incorporating combustible insulation, (i.e. not CE marked and not bearing either of the terms non-combustible or limited combustibility), cannot be used in these zones unless it has been proven to be capable of preventing fire spread to the adjacent compartment.

The incorporation of parapet walls or fire resistant ceilings into the roof construction can also provide a method of complying with this aspect of ADB2, but their addition to the construction can be costly and unwelcome. A straightforward solution to maintain the effectiveness of the compartmentation is to use mineral wool insulation, which is non-combustible (and is also of “Limited Combustibility”).

The role of insulation and fire resistance

Insulation and construction techniques for incorporating insulation into roof, wall and floor detail, have been given a very high profile by the drive for energy efficiency. This is enshrined in Approved Document L2 of the Building Regulations, which provides standards for controlling energy loss in buildings and is now updated in a regular and frequent cycle.

As a result of this drive for lower fuel use, smaller carbon footprints and improved sustainability, greater thicknesses of insulation are incorporated into building envelopes. Thus the importance of fire safety of the materials used is becoming ever more important.

There are many different types of insulation materials available and their fire performance differs considerably.

For example, structural materials used for external envelope construction like sandwich or composite panels, which employ plastic foam insulation cores sandwiched between thin skins of metal or timber, are of particular concern because the insulation is not classed as not non-combustible or of limited combustibility. In the presence of fire, the structural integrity of these panels could be lost and this can (and has) created dangerous and fatal conditions for building inhabitants and fire fighters.

Marketing terms such as "fire safe" and "fire proof", which are applied to some widely available types of plastic foam insulation products, can be misinterpreted as being somehow equivalent to "non-combustible", leading to confusion in the market.

However, the most widely used and certified non-combustible insulations are mineral wool products, which are manufactured from stone or glass. CE marked insulation products like mineral wool are fully compliant with non-combustibility requirements.

The building regulations applicable to all parts of the United Kingdom and the Republic of Ireland deem all products which achieve an A1 classification to BS EN 13501-1 to be non-combustible. This standard describes all A1 rated products as those which "will not contribute in any stage of a fire, including the fully developed stage".

The Building Regulations applicable to England & Wales, Northern Ireland and Ireland deem all products which achieve an "A2 (-s3, d2)" rating or higher to be of "Limited Combustibility" (including non-combustible A1 products).

Correct identification

The RRFSO is intended to minimise the risk from fire by identifying and reducing potential fire hazards to an acceptable level, which includes materials. It states that designers, specifiers and contractors have a duty to disclose to building owners and employers any design decisions which may affect risk; "including the use of combustible products in the construction".

Furthermore, the RRFSO clearly states that, designers may face criminal prosecution if they do not communicate all elements of the design that may affect fire performance, including the use of combustible insulation products.

Additionally, the Construction, Design and Management (CDM) regulations, introduced in April 2007, also clarify the significance of the RRFSO with regard to the responsibility of the building contractor and other specialist installers of fire resistant materials. Within Section 5, Paragraph 46 ("Enforcement in respect of Fire"), it states that contractors must fulfil the requirements of the RRFSO as part of their obligations under CDM. This means contractors must also consider the combustibility of the products they are installing and advise building owners and employers accordingly or risk criminal prosecution.

Viewing the effects of fire

The wide variation in fire performance of insulation materials under the same exposure conditions has been illustrated by a series of recent and live fire demonstrations. These were held in front of audiences of local authorities, architects, contractors, insurers, fire safety specifiers, fire service personnel and journalists.

These demonstrations were intended to provide a visual impression of the effects that may be observed when various insulation products are tested in the full-scale ISO 9705 room-corner test.

Clearly non-combustible

The room demonstration showed clearly that materials marked fire-safe will ignite with flames emerging from the rooms, and continue to burn until they are extinguished. In addition, they emit heavy smoke with fumes that could cause a sudden increase in combustion and fire, which could significantly affect the safety of anyone in the room, or fire fighters.

The non-combustible stone wool did not ignite during the demonstration, nor could flash-over, which can be seen as flames emerging from the rooms, be induced.

The duty of care of specifiers and installers to the building users and inhabitants would seem to dictate that their safety should not be compromised with a higher risk product.

Assurance of fire resistance in building materials

Use of imprecise terms such as fire safe, fireproof, fire resistant and self extinguishing for insulation products should not disguise the fact that they may in reality be combustible. The RRFSO clearly states that individuals may face criminal prosecution if they did not make a suitable or sufficient fire assessment.

It is clear, therefore, that any part of a building at fire risk, or where a fire would compromise the structural integrity, should be using CE marked non-combustible materials to protect it as standard. IFP

Fire Alarms Respo

By Sara Mudalige

Marketing Executive, Klaxon Signals

Sara Mudalige, Marketing Executive at Klaxon Signals, looks at how legislation has driven technological developments in the Fire Industry.

The introduction of the Disability and Discrimination Act (DDA) has played a pivotal role in the development of the Fire Industry. Organisations and businesses must have fire procedures in place that take account of the requirements of the DDA, including warning systems that cater for both the hearing and visually impaired.

In addition to the DDA, the Fire Safety Reform Order came into force in 2006, stating that the responsibility for fire safety lies with employers and that they have a duty to ensure the safety of everyone who uses their premises, including those in the immediate vicinity.

These policies have not only forced employer accountability, affecting companies and businesses, but have changed the way the fire industry has developed. Technology has moved on from its rudimentary beginnings with the simple fire bell and is gathering speed, making use of combined sounder-beacon technology and more recently, pre-recorded voice messaging.

Many fire and security systems have been redeveloped to take their capability beyond that of a basic audible warning. A sounder should no longer be used in isolation but in conjunction with a beacon, to comply with the DDA. The ideal solution for many applications is the use of both audible and visual technology: the sounder-beacon; this meets the demands of the consumer and complies with the UK's BS5839:1* and EN54** guidelines.

For example, Klaxon Signals offers the LED base sounder fire alarm that has a low profile design that is ideal for use in offices, hotels and hospitals. It combines a 95 dB sounder with 12 high powered LEDs that complies with the DDA. The unit's design is such that the light shines in a 360° spread, ensuring the visual warning will reach those standing or lying underneath it, and who perhaps may not have the ability to hear the sounder siren alone.

Sounder-beacons have become the market standard, and these dual purpose units are often a necessity in certain applications; for example, in a smoke filled area a guiding emergency light may not be seen, and in a high noise environment a sounder may not be heard. BS5839:1 states that where excessive noise is apparent, a visual indication of the alarm condition should be present. This clearly highlights the need for both audible and visual warning.

Industry

The EN54 approved Nexus alarm sounder series from Klaxon is currently unparalleled in the market for addressing legislative issues and industry requirements. The Nexus range consists of three product lines, each containing sounder and sounder-beacon variants: Nexus 105, Nexus 110 and Nexus 120, the numeral indicating sound output in dB(A).

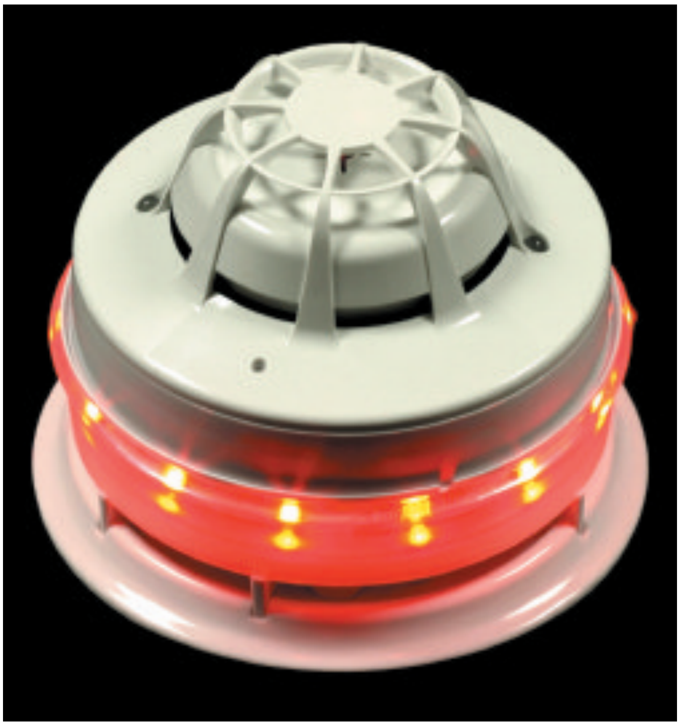
Although tone and volume settings can be preset, Nexus products also allow individual adjustment of the head settings for installations where

*BS5839:1. Fire detection and fire alarm systems for buildings. Code of practice for system design, installation, commissioning and maintenance.
**EN54. Fire detection and fire alarm systems.

nd to Legislation

precise local control is needed. Optimised for use in fire, industrial and marine applications, each unit provides 64 distinct alarm tones, three alarm stages and sound outputs up to 120 dB(A) at 1 metre depending on the tone. The second alarm stage on the Nexus 110 product is achieved via a reverse polarity option. Loops of sounders are automatically synchronised for maximum audibility in the event of an alarm.

Part of the Fire & Life Safety product range, Nexus sounders and sounder-beacons use 'first fix' technology and innovative quarter turn fasteners which facilitate faster and reliable maintenance. Sounder and sounder-beacon heads "click into place", allowing fitting or removal at any time as the base is the only part of the product that requires wiring. As the cabling requirement is reduced, commissioning time and costs are also reduced.



A combined sounder-beacon unit with powerful sounder and high output 5J xenon beacon is offered for applications requiring visual as well as audible warnings. This meets with BS5839:1 guidance regarding the necessities of visual alarm indication and ensures a very effective audio-visual signal.

In addition to the 5J xenon beacon option, Nexus sounder-beacons are also available in LED beacon variants. Designed for applications where low current consumption, reliability and synchronised beacon flashing are important, the new LED beacons and sounder-beacons can be powered by a 10-60V DC supply, making them particularly suitable for fire and security applications. These sounder-beacons can be operated in static or flashing mode, and a choice of sound outputs means there is a model to overcome differing levels of background noise.

General purpose fire alarms

Like the Nexus range, Sonos is a range of sounders, beacons and sounder-beacons that employ 'first fix' technology to enable quick connection/disconnection and user-specific tone and volume adjustment. LPCB (Loss Prevention Certification Board) approved, Sonos sounders and sounder-beacons are general purpose electronic devices for fire, security and industrial applications.

As well as the standard shallow base, Sonos units can be specified with a deep base for installations in which cable conduit is used. Deep bases are ingress protected to IP65, making them ideal for external as well as internal use.

Sonos sounder units draw currents from 6 to 35 mA depending on the tone set, and are compliant with all relevant EN regulations and British Standards. With a choice of 32 tones, including all major international standards, including VdS and NF approvals, the Sonos range has universal acceptance.

Voice messaging

The recent development of pre-recorded voice messaging in conjunction with the sounder-beacon is the next technological step in the fire industry. Although electronic sounders are able to effectively address most problems in the event of a fire, the voice sounder has the added benefit of providing clear instructions that ease confusion and improve response time.

Repeated nuisance and false alarms result in many warning signals being treated with indifference. Offices and work buildings have evacuation

procedures in place that employees must follow when a fire alarm sounds; training, practice and continual alarm testing leads to familiarity and a more efficient response time. But in areas where there is a high volume of visitors, training is impossible, and the public must rely on clear information and instructions from a reliable source. Behavioural responses to fire alarms tend to show that people react in accordance with their peers. In general people observe the actions of others, and if no one else appears to be responding to the alarm, are reluctant to take action themselves. Often visitors wait for confirmation or instructions from an authority figure or member of staff before responding, which may lose valuable time; unfamiliar surroundings can increase stress and confusion when a warning signal sounds.

The introduction of the voice sounder provides a clear, unambiguous warning message in the event of an emergency. Voice messages have proven to substantially improve evacuation response time to fire alarm or bomb alert situations; the voice alarm being the next 'big thing' in warning device technology. They have the added benefit of being able to promptly evacuate untrained personnel or visitors via clear and concise instructions. In essence, the voice sounder becomes the 'authority figure'.

Klaxon Signals has expanded its Sonos and Nexus Range of fire alarms to include new voice enhanced variants – where normal sounder signals are combined with a clear, synchronised voice message to help reduce confusion and distress during an active alarm. They are available as sounders or sounder-beacons.

Sounders, beacons and sounder-beacons from the Sonos and Nexus ranges form an integral part of Klaxon's Fire & Life Safety product range. 'First fix' technology is employed throughout both product families to enable quick connection/disconnection and user-specific tone and volume adjustment.

Responding to legislation

The NIA (National Indoor Arena) in Birmingham responded to the changes in legislation and awarded a contract to update the existing site-wide analogue/addressable fire alarm system to BDS Fire and Security (Northern). The warning devices installed were Klaxon's Sonos sounder-beacons.

The NIA has attracted over 4 million visitors since it opened in 1991. Located near the International Convention Centre in Birmingham City Centre, it is equipped to cater for a variety of sporting, musical and theatrical events.

Approximately 300 deep-base IP65-rated Sonos sounder-beacon units were subsequently installed in the NIA's two main car parks. New conventional fire alarm sounder circuits were also added, controlled by analogue/addressable sounder circuit controllers and supported by local power supply units with battery back-up. The existing fire alarm system was re-configured with additional networked control panels and repeater panels added.

The ability to source products and equipment that could meet the required performance and

legislation at the right price and within a specified timescale was vital to the success of the project. Graham Hawkins, Director of BDS, led the NIA project from BDS' Birmingham-based office. He remarked, "We chose the Sonos sounder-beacon from Klaxon Signals for the job. This was for several reasons, including ease of installation, excellent visibility from wide angles offered by the transparent beacon dome, and, of course, competitive pricing. I'm particularly happy in the knowledge that we are installing a market-leading product with the necessary legislative credentials."

The Sonos sounder-beacon uses LEDs as its light source, drawing significantly less current than traditional xenon beacons without a loss of light output. The current consumption of the sounder-beacon unit also has a significant impact on the fire alarm system design. Being able to achieve high sound output coupled with a good visual warning helps the Sonos sounder-beacon unit to limit the size of the power supply and battery back-up.

Sounders, beacons and sounder-beacons from the Sonos and Nexus ranges form an integral part of Klaxon's Fire & Life Safety product range. 'First fix' technology is employed throughout both product families to enable quick connection/disconnection and user-specific tone and volume adjustment. Sonos and Nexus products follow DDA guidelines.

Klaxon Signals is working alongside its partner companies and customers to ensure its products, and the installation of its products, are in line with the latest fire safety regulations. Any organisation or individual wishing to discuss its, or Klaxon's, obligations regarding new legislation may contact Klaxon's Technical team directly or visit www.klaxonsignals.com.

Klaxon Signals Limited is one of the world's leading manufacturers and suppliers of sound and vision signalling equipment for fire and life safety, industrial and security applications. Part of Halma p.l.c., Klaxon offers an extensive range of fire alarm sirens, electronic sounders, buzzers, beacons and bells, in addition to innovative evacuation technology and software. IFP

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Are you getting the cable you expect?

Many of the electric cables that run through our buildings are designed to increase public safety in the event of fire. But, says Terry Journeaux technical marketing manager at Prysmian Cables and Systems, with fake, faulty and misleadingly described cables in the marketplace, you may not be getting the product – or the performance – you expect.

Terry Journeaux

Technical marketing manager,
Prysmian Cables and Systems

Over the last 25 years, the electrical industry has made great strides to improve the safety of the cable installations that snake through the fabric of every building providing power and light, with the development of products designed to increase public safety by reducing flame propagation and the emission of smoke and noxious fumes in the event of fire.

Highly durable fire resistant cables are used to preserve the power supply to essential life safety systems such as those used for fire detection, fire alarm signal paths, voice alarm systems and emergency lighting systems. Low smoke halogen-free cables are typically specified for enclosed-space public-area installations and reduce emissions of smoke and fumes which can pose a far greater risk to life than the fire itself. Because of the vital roles these cables play in the preservation of life, there is absolutely no room for error when it comes to using the correct cable for a specific fire safety requirement.

Fakes in the fire resistant market

It is a sign of the economic times that faulty and substandard cable products have become a major issue in the electrical industry. Huge increases in the price of copper have lead unscrupulous manufacturers to cut corners in some instances by reducing the diameter of copper conductor wire used in cables or by using badly recycled copper, copper-coated aluminium or even substituting steel wire instead of copper. The effect is reduced conductivity potentially causing a cable to overheat and catch fire.

Some of these cheaper cables, which are usually of non-UK manufacture, also use the wrong type of insulation and sheathing materials, which can lead to poor smoke and fire performance in

supposedly fire and smoke-rated cables.

A most concerning recent activity has been the targeting of the fire resistant cable markets with "fake" cable which has no fire resistance at all.

One example of cable taken from a fire alarm installation and examined in the Prysmian laboratory illustrated the steps some manufacturers and their suppliers will take to increase their profits with no regard to the lives they are potentially putting at risk due to the lack of essential performance of their product.

The cable in question had markings that included "BS5839-1:2002 26.2d BS6360/BS6387 CWZ BS EN50200 PH30 British Made Cable" which would suggest a fire resistant cable. However, examination revealed some alarming findings including:

– Conductors that were actually copper clad aluminium instead of copper
– The insulation was actually PVC which, far from being of a fire resistant type, quickly softened and degraded when subjected to fire
– The screen was not in contact with the drain wire so there would be no automatic earthing of the screen

In fact, when tested in the laboratory, this particular cable survived for less than one minute, although the marking claimed 180 minutes, and indeed met none of the claimed fire related tests.

Never has the warning "caveat emptor" been so necessary. Use of such a cable would potentially put lives at risk due to non-functioning of the fire alarm system and under the UK Regulatory Reform (Fire Safety) Order 2005 or even the Manslaughter and Corporate Homicide Act of 2008 could lay the installer open to serious penalty.

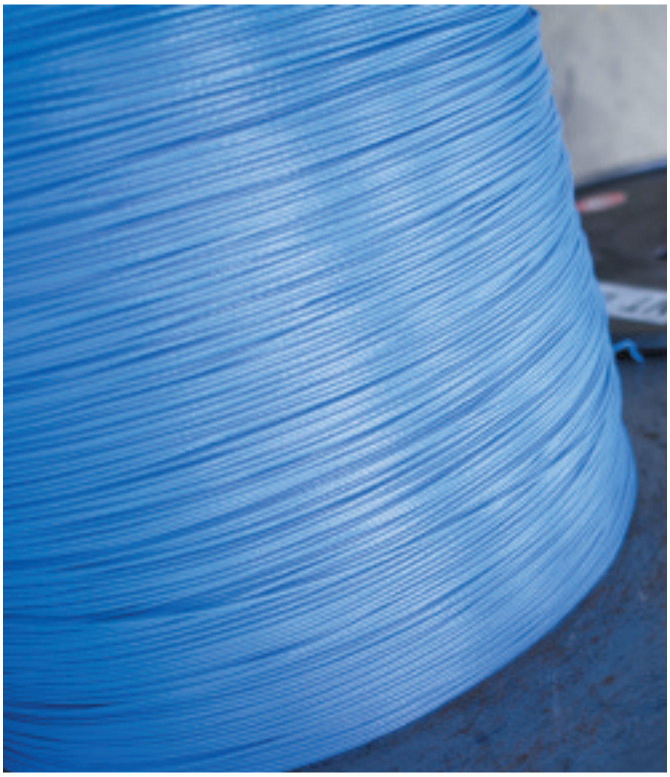
Confusion over low smoke cables

While the issue of faulty and unsafe cables in the marketplace continues to pose a problem, equally

important is the accuracy of the information given to describe the performance of the cable. Unfortunately, in the area of "low smoke halogen free" cables, the lack of agreed terminology and a reliance on descriptive trade names has already lead to the discovery of traditional PVC cables in the market which are misleadingly described.

PVC cables give off hydrogen chloride gas when burnt, which is corrosive and highly irritant when inhaled and in contact with the eyes and skin. In addition to choking fumes, burning PVC cables emit hazardous volumes of dense smoke that may obscure exit routes and make safe evacuation of buildings much more difficult.

Clearly it's important to know what you're buying and installing but with terminology such as LSOH (Low Smoke Zero Halogen), LSHF (Low Smoke Halogen Free), OHLS (Zero Halogen Low Smoke), LSF (Low Smoke and Fume) so widely used and misused within the cable industry it's easy to see where confusion arises.



When used correctly, as in British Standards (e.g. BS6724, BS7211, BS7629, BS7846), the terms "low smoke", "halogen free" and "zero halogen" relate to clearly defined test methods and performance requirements.

Low smoke describes a product tested in accordance with BS EN 61034-2. This smoke density test (known as the 3 metre cube test) measures how much light is transmitted through the smoke produced by a burning a sample of cable, where 0% means the light is totally obscured and 100% is full light transmission. A minimum requirement of at least 60% residual light transmission must be achieved.

"Halogen free" describes a product tested in accordance with BS EN 50267-2-1. Under fire conditions these products must emit no more than 0.5% halogen acid.

Prysmian is a leader in the development of low smoke halogen free technology and has its own state-of-the-art fire testing lab in the UK where it carries out rigorous testing on all of its cables to ensure that they exceed British Standards requirements.

Whilst reference to British Standards should be used to check claimed performance, problems arise for products where there is no nationally published standard. In these cases the only description is often through a generic acronym such as LSOH. Great care is needed if using such descriptions to define a level of product performance. Many acronyms are in fact trade marks – LSOH is actually a registered trade mark of Prysmian. However protection of such trademarks has become increasingly difficult for manufacturers and the major acronyms are widely in use as generic product descriptions. Unfortunately not all users are using them with the same meaning as the trade mark owner and purchasers can be mislead into thinking they are getting a low smoke halogen free cable as defined by the appropriate tests, when in fact they are actually buying something quite different that has far from low smoke and acid emissions.

Beware also of products described as LSF. There are no specific standards for LSF cables and this term may be used to describe modified PVC cables which when tested may emit more than 20% hydrochloric acid – not at all the level of performance you might believe you're getting when you make your product selection.

Quality assurance

So, what can you do to ensure that the cables used are fit for purpose and will not leave you open to fire and safety risks?

Evidently, it is not sufficient to look only for the necessary standards to be marked on the product but also to ensure that the product is a recognised brand from a reputable manufacturer and backed by verifiable approval from an independent body.

Also, as demonstrated in the case of low smoke cables, an over reliance should not be place on acronyms alone as you may end up with a product which performs far below the standards you expect or need, potentially placing lives in danger.

Cables from a reputable manufacturer in the UK such as Prysmian, will carry the BASEC or other recognised approval mark on the cable which guarantees that the cable is of a high quality and fit-for-purpose. The mark confirms that they have been rigorously tested and manufactured under an approved quality management system. For specifiers seeking third party approval of products there is no higher level of approval than the BASEC mark.

Surprisingly, the difference in cost between cables which carry the BASEC mark, and those who don't, is not very great. The extra cost is a small price to pay for the reassurance that you have a quality product, fit-for-purpose, that won't put lives at unnecessary risk. IFP

Terry Journeaux is Technical Marketing manager of Prysmian Cables and Systems Limited – formerly Pirelli Cables. Since graduating from the University of Sussex, he has obtained 35 years experience working in the cable industry in technical, commercial and marketing roles. Much of his career has been closely involved in the development of fire performance cables and markets

Ignorance is no

Does it matter that the lay person does not understand the importance of Passive (Built-in) Fire Protection? This article sets out to look at the reality of this question.

By Wilf Butcher, CEO

Association for Specialist Fire Protection (ASFP)

On 22nd September 2008, the 'London Evening Standard' ran a feature on a two year battle by residents of a luxury block of apartments in Rotherhithe, London over a number of workmanship issues. The ensuing investigation, relating to water damage and toxic mould growth, uncovered the 'shocking discovery' that:

1 There was little or no fire compartmentation between floors or apartments and inadequate fire resistance to the structural steel frame.

2 Of equal seriousness, shafts rising from the basement car park through all six floors were able to vent smoke unchecked on all floors and in places no fire dampers were incorporated in the basement air ducting system.

Put simply and without wishing to over dramatise the matter, the lives of all the residents of this apartment complex were being put at risk.

The article concluded that many homes have build problems, but perhaps this is something special.

ASFP contracting member, Sharpfibre Ltd. who is undertaking the remedial programme on this complex, would argue that this is far from a special case and if anything this project is merely the tip of the iceberg. In fact, they are currently undertaking the same essential remedial work at another block of apartments in Chiswick, London.

Far from being an isolated incident Sharpfibre,

Over the last ten years there has been an upsurge of apartment block construction all over the United Kingdom and until the near collapse of the housing market earlier this year, such apartments were being snapped up, 'off plan', faster that they could be built.

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along with other ASFP contracting members regularly identify buildings with poorly installed compartmentation and fire protection measures, as misapplied by **non** third-party certificated companies.

Over the last ten years there has been an upsurge of apartment block construction all over the United Kingdom and until the near collapse of the housing market earlier this year, such apartments were being snapped up, 'off plan', faster that they could be built.

In this drive to meet demand, who has been responsible for ensuring the fire protection needs of a building are met? Or, when put another way, when things go badly wrong, as in this case, who is to blame when they are not met?

- Do the fire services have all the powers that it needs?
- Are the benefits of third-party certification of specialist installers fully recognised and respected (In the UK it is not a mandatory requirement)?
- How aware is the insurance industry of the non-compliance and the insured risk?

Many of these issues are complex and I regret to state, some are seen from the perspective of a 'head in the sand' but the fact remains that they need to be addressed.

Twenty five years ago, if you had asked the man in the street where on his list of priorities he would place safety features when selecting a new car, chances are it would not have been very high. Today, it's right there at the top of his list and he demands it.

In many respects buying an apartment today is not so different to buying a car all those years ago (except the cost is hundreds of times greater)! The last thing on the mind of the buyer when viewing his dream apartment is the level and quality of the passive fire protection, built in to protect him from his neighbours.

As with most things in life the answer is never that simple. None the less, this issue must be addressed if we are to avoid the inevitable fatal consequences. To do this we must ask some very difficult questions, for example:

- Is the whole inspection process fit for purpose? Clearly in the case outlined above this would seem not to be the case.
- What is the level of specifier awareness/ responsibility in relation to what is happening on a day to day basis with his/her original specification?
- To what degree is the contractor's drive for cost savings greater than his willingness to understand the dangers of his cost cutting actions (particularly in the current financial climate)?
- Dare I say it; is the fire industry itself getting its educational message across as well as it may?
- How effective is the legislative process, or is it assumed by government that, as is the case in the UK, the advent of the Regulatory Reform (Fire Safety) Order and guidance given in Approved Document B is sufficient. (In fact the RRO does not cover apartment blocks)?
- Is the growing freedom given to fire engineered solutions (particularly with an eye on new carbon friendly modular construction) as safe as the theory would lead us to believe?

In many respects buying an apartment today is not so different to buying a car all those years ago (except the cost is hundreds of times greater)! The last thing on the mind of the buyer when viewing his dream apartment is the level and quality of the passive fire protection, built in to protect him from his neighbours.

In most instances he will not even know it is there. This is one occasion, however, where 'out of sight' should never be termed as 'out of mind'. Fire safety within the structure of this type of construction must be pushed up the agenda because this is not a theoretical debate. In the last few months alone there have been a number of significant fires in apartment complexes within the UK. Sixteen homes, for example, were destroyed in June following a twelve hour blaze in a block of flats in Hounslow, London.

This issue will not go away and I for one do not want to look back at some point in the future to regret that this matter was not addressed. In my opinion the time has come for all of the above groups to come together to debate this issue and respond appropriately.

So, in answer to my own question 'Does it matter that the lay person does not understand the importance of Passive (Built-in) Fire Protection?' Yes, it matters a great deal! IFP

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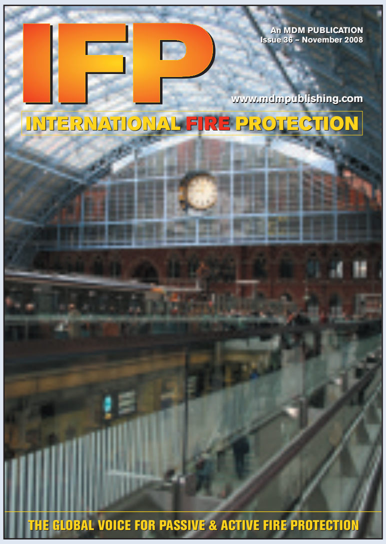

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